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Behavioral and Emotional Risk and Resilience among Socially Disadvantaged Children in Canadian Cities

by

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Abstract

Identifying the common factors that produce risk and resilience in children is an important step both in conducting an ecologically-based assessment and in designing ecologically-focused services. Although the effect of several individual, family, school, and community level factors on childhood behavioral and emotional problems and prosocial skills have been previously studied, there is a paucity of empirical research that has investigated them in combination. Factors that related to city characteristics are missing. The purpose of this study was to explore whether social and economic characteristics of a city influence the behavioral and emotional outcomes of Canadian children within socially disadvantaged families. To do so, a two-level hierarchical linear model (HLM) was developed using the first cycle of the National Longitudinal Survey of Children and Youth and the 1996 Census data gathered from 25 Canadian major cities. Prosocial behavior, hyperactivity-inattention, physical aggression-conduct disorder, indirect aggression, emotional disorder-anxiety, and property offences were examined through 6 child-level variables and 11 city-level variables.

The study included 2,362 children between 4 and 11 years of age who came from low SES families. HLM was used to examine the variation in socially disadvantaged children's behavioral and emotional outcomes within and between cities. The aim was to determine whether there are city "effects" that are associated with children's behavior and emotional outcomes regarding risk and resilience.

Results from this exploratory study identified several child and city characteristics that were significantly associated with children's behavioral and emotional outcomes, thus providing empirical evidence of the micro (child) and the macro (city) level of

environmental effects on children's behavioral and emotional outcomes. The findings are consistent with an ecological theory that a child's social ecology consists of many different systems, each of which has the capacity to influence developmental outcomes. Although factors in the microsystem have much stronger impacts on low SES children's behavioral outcomes than factors in the macrosystem, the influence of the macrosystem should not be ignored. Implications for practice and recommendations for future research are provided in light of the findings.

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Dedication

This work is dedicated to my grandparents Guan Qiu and Zhibin Liu for the wonderful time and happy memories we had together as a family. Your kindness and unconditional love will be an inspiration to me forever. To Grandpa, for modeling integrity and discipline. To Grandma, for her grace and devotion to family.

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CHAPTER 1

INTRODUCTION

Children coming from socially disadvantaged families experience a high rate of socio-emotional and behavioral problems that put them at risk for normal development (Garmezy, 1991; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004; Luthar, 1999; Rutter, 1985). During the past several decades, researchers have identified a number of factors that significantly increase the risk that children will be unable, as adults, to earn a living, form healthy families, or contribute to their communities. Results from a large number of studies have shown that children's futures are considerably dimmer when they are reared in conditions of poverty, family dysfunction, abuse, and other adverse living circumstances (Doll & Lyon, 1998; Luthar, 1999, 2003; Werner & Smith, 1982, 2001). Among these conditions, childhood poverty is the most consistent predictor of dysfunction in adulthood (Doll & Lyon, 1998; Felner, 2005). Concern from an educational perspective with "at-risk" children is not simply that they may fail to learn, but rather that they will become disconnected from their potential to contribute to society and economic productivity.

Findings from research on child development, however, have also shown that a significant number of children reared in the most adverse circumstances have developed into healthy and productive adults (Cowen, Wyman, Work, & Parker, 1990; Doll & Lyon, 1998; Luthar, 2003; Masten & Garmezy, 1985; Werner & Smith, 1982, 1992, 2001). These observations led to a critical shift in the focus of research from a static consideration of risk factors toward a more dynamic study of resilience.

According to Luthar, Chiccetti, and Becker (2000), resilience refers to "a dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar et al., 2000, p. 543). Implicit within this notion are two critical conditions: (1) exposure to adversity and (2) the achievement of positive outcome despite adverse circumstances on the developmental process. In the early studies of resilience, efforts were primarily focused on the individual qualities of "resilient children," such as autonomy and self-esteem. As work in the area evolved, researchers increasingly acknowledged that resilience may often derive from factors external to the child. Subsequent research led to the delineation of three sets of factors implicated in the development of resilience: (1) attributes of the children themselves, (2) aspects of their families, and (3) characteristics of their wider social environments (Luthar et al., 2000; Masten & Garmezy, 1985; Masten & Powell, 2003; Werner & Smith, 1992, 2001). Thus the study of risk and resilience in the context of the family, school, neighborhood, and community has become more relevant. Today, researchers are increasingly striving to understand how such factors may contribute to positive outcomes by focusing on identifying those variables that predict resilience in the face of adversity. Such attention to underlying mechanisms is viewed as essential for advancing theory and research in the field, as well as for designing appropriate prevention and intervention strategies for individuals facing adversity (Cowen, Work, & Wyman, 1997; Goldstein & Brooks, 2005; Luthar, 1999).

Due to the complex nature of circumstances surrounding risk and resilience, an ecological model developed by Bronfenbrenner (1979) has been suggested for understanding the developmental processes of risk and resilience (Felner, 2005; Luthar et

al., 2000; Luthar & Zelazo, 2003; Stevens, 2005). From the ecological perspective, environmental factors, family characteristics, and child characteristics all influence each other and make reciprocal contributions to the events and outcomes of child development. Such theoretical accounts "in which contextual surrounds and transactional interchanges are emphasized, have formed the conceptual bases for resilience research involving diverse risks including family poverty, experiences of maltreatment and others" (Luthar et al., 2000, p. 552).

So far, existing research has mainly focused on the child, the family, the school, and the neighborhood. Little empirical research could be found that examines the relationship between the social and economic environmental aspects of the city in which a child resides and the behavioral and emotional outcomes of children regarding risk and resilience. As a result, researchers have been unable to determine whether there are city effects in reducing children's behavioral and emotional risk and increasing resilience. This outcome may be due to the lack of a national database in the past and the lack of availability of relatively newly developed statistical techniques such as hierarchical linear modeling (HLM). Today, with the available data and advanced statistical techniques, it is possible to examine and uncover the resilience mechanisms by investigating underlying risk and resilience processes in a broader macro-social level.

There are two relevant national databases available. One is the National Longitudinal Survey of Children and Youth (NLSCY), which is a long-term survey designed to measure child development and well-being. The first cycle of the survey was conducted by Statistics Canada in 1994-1995 on behalf of Human Resources Development Canada. The primary objective of the NLSCY was to develop a national

database on the characteristics and life experiences of children and youth in Canada as they grow from infancy to adulthood. One of its specific objectives was to monitor the impact of various risk factors, life events, and protective factors on the development of these children (Statistics Canada, 1996). The second is Census data, which provides information on city characteristics such as socioeconomic conditions, population characteristics, social mobility, social climate, and social services conditions. By combining these two information resources, risk and resilience in a broader macro-social level specifically the city level, can be explored.

Purpose of the Study

The purpose of this study was to explore whether social and economic characteristics of a city influence the behavioral and emotional outcomes of Canadian children within socially disadvantaged families. To achieve this objective, six behavioral and emotional outcome variables were used: prosocial behavior, hyperactivity-inattention, physical aggression-conduct disorder, indirect aggression, emotional disorder-anxiety, and property offences. The variables obtained from the first cycle of the National Longitudinal Survey of Children and Youth (NLSCY) were separately investigated using the hierarchical linear model (HLM) technique. The independent variables were derived from the NLSCY and the 1996 Census data gathered from 25 Canadian major cities. In this study, HLM was used to examine the variation in socially disadvantaged children's behavioral and emotional outcomes within and between cities. The primary purpose was to determine whether there are city "effects" that are associated with children's behavior and emotional outcomes regarding risk and resilience. In other

words, are some cities more effective than others in reducing childhood vulnerability, and if so, why?

Research Questions

The research questions were:

1. What is the average level of behavioral and emotional outcomes among low SES children in Canadian cities?
2. How do behavioral and emotional outcomes of low SES children vary across Canadian cities?
3. What child characteristics contribute to the variation in behavioral and emotional outcomes of low SES children in Canadian cities?
4. Do city characteristics affect low SES children's behavioral and emotional outcomes over and above the effects of child characteristics? If so, what city characteristics contribute to the variation in behavioral and emotional outcomes of low SES children in Canadian cities?

Definition of Terms

Definitional diversity can result in varying conclusions regarding risk and resilience processes. Research literature on resilience reflects little consensus about definitions (Luthar, et al., 2000). For clarity, in this study, risk refers to those characteristics and circumstances that predispose children to have negative experiences. Examples include poverty and single parent families.

Resilience is defined as observing a normal or positive developmental outcome in spite of exposure to major risk for the development of serious social or health problems. This implies that children have been exposed to risk and have made adaptation or have

benefited from environmental assets that produced good developmental outcomes (Fraser, Kirby, & Smokowski, 2003).

Socioeconomic status (SES) is the relative position of a family or individual in an hierarchical social structure, based on their access to or control over wealth, prestige, and power (Mueller & Parcel, 1981). In this study SES is operationally defined as follows: a composite of the level of education of the Person Most Knowledgeable (PMK) about the child in the household, the level of education of the spouse/partner, the prestige of the PMK's occupation, the prestige of the occupation of the spouse/partner, and household income (Statistics Canada, 1996).

A low SES family in this study includes five types of family socioeconomic conditions[1] (Statistics Canada, 1996):

- the PMK has grade 13 and the spouse grade 12, the spouse is employed as a semi-professional position and the PMK is not in the labour force, and household income is approximately $25,000 (SES score code = 0.0);
- the PMK and spouse have both completed grade 12, the PMK is employed in a semi-skilled clerical position and the spouse in a semi-skilled manual position, and household income is approximately $16,000 (SES score code = -0.5);
- neither the PMK nor the spouse have completed high school, the PMK is employed in unskilled clerical position, the spouse is employed in an unskilled manual position, and household income is approximately $20,000 (SES score code = -1.0);

[1] On the NLSCY micro data file, the scores for SES were coded from -2.000 to + 1.750. In this study the cutoff score for low SES was set at 0. The five types of family socioeconomic conditions described above represent the families with SES score codes equal to or below 0 (SES score code ≤ 0). The decision to use this criterion was made based on the 1995 Low income cutoffs and Low income measures released by Statistics Canada Income Statistics Division (2002).

- neither the PMK nor the spouse have completed high school, neither the PMK nor the spouse are in the labour force, and household income is approximately $12,000 (SES score code = -1.5); and
- a family in which there is no spouse, the PMK has not completed high school, the PMK is not in the labour force, and household income is approximately $10,000 (SES score code = -2.0).

Justification for the Study

Data collected in many fields, such as education, nursing, medicine, psychology, and sociology are hierarchically structured. For example, students are in classes within schools, patients stay within wards in hospitals, and individuals reside within cities. Unfortunately, in the past most analyses of data in these fields have ignored the hierarchical structure of data (Raudenbush & Bryk, 2002). Failure to consider the hierarchical nature of data leads to statistical results that cannot be clearly interpreted (Kreft & De Leeuw, 1998). Recent advances in statistics and computing sciences have produced a powerful technique that accommodates the hierarchical structure of data. This technique is known as hierarchical linear modeling (HLM). Clearly, the data for this study of resilience have a hierarchical structure, with children residing within cities. Before the NLSCY was undertaken there were few statistical surveys describing a broad range of characteristics of children in Canada. The limited generalizability of findings based on small samples has been one of the limitations identified in the literature on risk and resilience (Luthar et al., 2000). Now with the availability of this NLSCY database and census data, and with the availability of HLM and necessary computer programs, it is possible to test the ecological theory and to extend previous investigations by (a)

describing the concepts of risk and resilience from an ecological perspective beyond the microsystem; (b) incorporating a culturally diverse large sample of children who lived in 25 major Canadian cities; (c) examining both risk and resilience factors together; and (d) separately examining several behavioral and emotional outcomes in one study.

So far, five cycles of the NLSCY data have been made available. The first cycle was conducted in 1994-1995, the second cycle in 1996-1997, the third cycle in 1998-1999, the fourth cycle in 2000-2001, and the fifth cycle in 2002-2003. In this study, only the first cycle data was used. This decision was made for the following reasons:

1. The NLSCY offered no information on city characteristics. To overcome this limitation, the 1996 Census data was used to generate city information describing (a) population characteristics, (b) socioeconomic conditions, (c) social mobility, and (d) social services conditions. Since census data is gathered every five years, the combination of the NLSCY data and the census data must be compatible in regard to a time line.

2. Most risk and resilience researchers agree that short and long term longitudinal studies on resilience are critical because resilience is a dynamic developmental construct (Doll & Lyon, 1998; Luthar, 2003). However, despite the very relevant information that the NLSCY is striving to supply to the public, with only five cycles of the NLSCY data available, and with the 5 year time line of the census data, the first cycle data and the 1996 census data were combined to do this exploratory investigation of risk and resilience among socially disadvantaged children in Canadian cities. The rationale is to provide a research record from the result of the first cycle of the NLSCY data, and later on, when more cycles of the NLSCY data are available, and more compatible (in terms of a time line) census data becomes available, we can again combine the NLSCY data and

the census data to examine the same topic base on the longitudinal data. In this case, although the most up to date data (e.g., the fourth cycle data and the 2001census data) was not used, in the long run, this choice seems to make the most sense, and may provide the foundation for interesting longitudinal results.

Organization of the Thesis

This thesis is organized into five chapters. Chapter 1 serves as an introduction of research in risk and resilience and includes the purpose of the study, research questions, definition of terms, and justification for the study. Chapter 2 reviews the research literature, which is then followed by (a) historical overview of risk and resilience, (b) current concerns and challenges, (c) behavioral and emotional problems of childhood, (d) social competence: the focus on prosocial behavior, and (e) summary. Chapter 3 describes the data sets used for this study and the procedures involved in analyzing the data. Chapter 4 reports the statistical results. Chapter 5 summarizes the research findings, discusses their implications for practice, and provides recommendations for further investigation.

CHAPTER 2

REVIEW OF THE LITERATURE

The purpose of this literature review is to provide a background in which risk and resilience can be understood in the context of individual, family, and community contexts. It contains five parts. The first gives an historical overview of risk and resilience with a synthesis of research findings. The second part is a discussion of three emergent themes in the research literature: definition concerns, multidimensional nature of risk and resilience, and ecological theory of child development. The third part presents the behavioral and emotional problems of childhood and the factors that influence the onset of these problems. The fourth section provides information on prosocial behavior. The chapter ends with a summary of the conclusions drawn from the literature review as they pertain to the research questions in this study.

Historical Overview of Risk and Resilience

In order to have a thorough picture of the evolving process of the work being done in the area of resilience, it is first necessary to have an understanding of risk because the concepts of risk and resilience are inextricably related. Historically, the study of resilience emerged as a byproduct of the study of risk. As some researchers have pointed out (Doll & Lyon, 1998; Luthar, 2003; Rutter, 1985), the study of risk has progressed through three phases.

The first phase of risk research was concerned with demonstrating that negative life experiences such as exposure to poverty or extreme stress were implicated in the development of mental health problems. For example, Bowlby's initial (1951) work on attachment provided strong evidence that family experiences and parent-child

interactions have a significant impact on children's psychological development. Bowlby's attachment theory (1982) suggested that children deprived of maternal attachment are more likely to develop maladaptive behaviors in the future. The work of Spitz (1946) on infants' responses to institutionalization and deprivation of mothering during their first year for a prolonged period (3 to 4 months), revealed severe disturbances in some infants (termed anaclitic depression) which resulted in early death for some and poor developmental outcomes for many others. Spitz concluded that severe environmental deprivation placed infants at serious risk for developing cognitive, social, and emotional problems and reduced the likelihood that they would develop an overall sense of well-being.

The second phase of risk studies was marked by research conducted to provide a better conceptualization of how different types of life experiences relate to varying types of outcomes. During this phase, there were several important studies that were instrumental in transforming what had been a search for risk pathways into an examination of resilience. For example, in their longitudinal studies of all the pregnancies and births within the community of Kauai in 1955, Werner and Smith (Werner, 1989; Werner & Smith, 1982) traced the developmental pathways of approximately 500 children who were exposed to a variety of risk factors over 32 years of life. According to Werner and Smith (1992), these children were exposed to difficult circumstances such as prenatal stress, chronic poverty, low parental education, family discord, and parental psychopathology. However, almost one third of these high-risk children grew into competent, confident, and caring young adults. These individuals were classified as resilient.

Using a longitudinal prospective study design established by Glueck and Glueck (1950), Long and Vaillant (1984) located 87% of the original Boston Underclass Study's control group (N = 456) of non-delinquent junior high school boys. They tested the hypothesis that extreme poverty and chaotic family experience produce a self-perpetuating underclass. By following the lives of highly impoverished underclass and stable working-class children in Boston from the time they were 14 years old until they reached the age of 47, Long and Vaillant refuted the hypothesis that chances of escape from underclass were minimal. They concluded that although attained social class was somewhat lower for the disadvantaged group, given the opportunity for steady employment and occupational mobility, the children from inner-city neighborhoods did not inevitably perpetuate their initial disadvantages. Indeed, most of these children displayed unexpected resilience.

Although the second phase of risk research developed more detailed conceptualizations of how different types of risk relate to different types of outcomes, the dynamic interaction among personal characteristics, environmental conditions, and situational circumstances that might alter the usual path of risk and produce more favorable outcomes was ignored (Gordon & Song, 1994; Masten & Garmezy, 1985). A different perspective on the problems of risk and vulnerability emerged with the third phase of risk research. It is in this phase that researchers began transforming the study of risk into consideration of resilience as well. These studies overlapped in time with many second phase studies, but were instigated by the observation of numerous researchers (Garmezy, 1991; Luthar, 2003; Rutter, 1987) that not all children characterized as at risk actually experienced negative outcomes. In fact, even under the most adverse

circumstances, a significant number of children had developed into competent and productive adults. This observation posed the interesting question: Why do some individuals do considerably better than others in similar circumstances? By asking the question in this way, research has shifted direction from a static consideration of risk factors toward a more dynamic consideration of negotiating risk situations (Fraser et al., 2003; Rutter, 1987).

The third phase studies have spanned more than two decades, examining the impact of multiple risk and protective factors, singly and in combination, on significant indices of child and adult adjustment (Doll & Lyon, 1998; Wright & Masten, 2005). As a result, substantial progress has been made in the area of risk and resilience. A common set of findings has been consistently confirmed by the majority of the third phase studies. For example, from what has been learned to date about the developmental pathways of risk, childhood poverty is the most consistent predictor of dysfunction in adulthood. Ineffective and uncaring parenting is a second powerful predictor of adult failure, followed by experiencing maltreatment and marital conflict or other forms of family dysfunction (Doll & Lyon, 1998; Hodgkinson, 1995; Luthar, 1999). Research has shown that it is the exposure to multiple risk variables and conditions that increases one's chance of later maladjustment (Doll & Lyon, 1998; Luthar et al., 2000; Sameroff, Gutman, & Peck, 2003; Stoiber & Good, 1998). Further, the younger the child, the greater the risk and vulnerability (Fantuzzo, McWayne, & Bulotsky, 20[illegible]; Goldstein & Brooks, 2005).

Researchers have identified several individual and contextual resources that may protect against risk factors. Three broad categories of such resources have been identified: (a) individual characteristics including gender, age, intellectual ability such as

IQ, self-regulation, self-perceptions of competence, worth, confidence, and easy temperament; (b) family characteristics, such as the quality of parent-child attachment, family cohesion and parental expectations and involvement; and (c) social contextual characteristics such as strong social networks, good schools, quality of social services and health care, and community features that promote prosocial values and provide opportunities and positive reinforcement (Benard, 1991; Garmezy, 1991; Luthar & Zelazo, 2003; Masten & Powell, 2003). Exposure to multiple protective factors increases one's chance of competent social adjustment (Luthar, 2003; Werner & Smith, 2001).

Current Concerns and Challenges

Several emergent themes in the research literature need to be noticed. First, there has been considerable confusion throughout the three phases of risk research regarding the precise meaning of many terms used by researchers. Second, both risk and resilience are multidimensional. Their statuses are dynamic and context dependent. They are not fixed, but can vary across time, circumstances, and contexts. Third, a multi-level ecological model of child development developed by Bronfenbrenner (1979) has shown to be relevant to the study of risk and resilience in children. In the following section, a brief discussion of the three themes is presented.

Definition Concerns

Without question, the theoretical and research literature on risk and resilience reflects little consensus about definition. In both theoretical writing and empirical research, risk and resilience are defined in various ways (Barton, 2005; Kaplan, 2005; Luthar et al., 2000; Luthar & Zelazo, 2003). For example, risk conditions examined have ranged from a single stressful life experience, such as exposure to war (e.g., Macksoud &

Aber, 1996; Zvizdic & Butollo, 2001) to multiple adversities such as poverty combined with HIV/AIDS, and child abuse (e.g., Cook & Toit, 2005). Similarly, there has been substantial diversity in defining positive adjustment among individuals at risk. For some researchers, at-risk children must excel in multiple adjustment domains to qualify for labels of resilience (e.g., Tolan, 1996), whereas others have required excellence in one major area with at least average performance in other areas (e.g., Luthar, 1991; Luthar, Diernberger, & Zigler, 1993). This definitional diversity results not only in varying conclusions regarding risk and protective processes but also in approaches to measuring risk and positive adaptation (Cicchetti & Rogosch, 1997; Luther & Cushing, 1999; Luthar & Zelazo, 2003; Naglieri & LeBuffe, 2005).

As some researchers (Boyden & Mann, 2005; Luthar & Zelazo, 2003) pointed out, the construct of resilience itself cannot be directly measured. It is inferred based on direct measurement of the two component constructs: risk and positive adaptation. Therefore, careful consideration of the two components is recommended. Luthar and Zelazo (2003) suggested that risk indices should be constructs that have significant statistical links with child maladjustment in important domains. The indicators of positive adaptation should include relatively good outcomes such as the presence of health or the absence of disease, depending on the nature and the severity of the risk under study. In the absence of any universally employed operationalization of risk and resilience, Luthar et al. (2000) suggested that researchers need to clearly explicate the approaches they select to define both risk and resilience and provide justifications for choices made on both conceptual and empirical grounds.

Multidimensional Nature of Risk and Resilience

Both risk and resilience are conceived of as multidimensional. They are dynamic and context dependent. Research has shown that a child is often adaptive in some aspects of his or her life but not in others. For example, high-risk children manifest competence in some domains but exhibit problems in other areas. At-risk children who are considered as resilient on the basis of particular competence criteria can reflect considerable heterogeneity in functioning across other areas (Luthar et al., 2000).

Of children with histories of maltreatment, Kaufman, Cook, Arny, Jones, and Pittinsky (1994) found that almost two-thirds were academically resilient, yet only 21% manifested resilience in the domain of social competence. Moreover, being resilient or competent does not imply that children survive without pain or struggle. Psychological distress such as problems of depression and posttraumatic stress disorder have been observed in adolescents who were considered as behaviorally competent (Luthar, 1991). Werner and Smith (1992) found that many resilient children had painful memories, nightmares, and other adjustment problems. Among apparently resilient children, the unevenness of functioning across developmental domains has been a concern (Luthar et al., 2000). The need for specificity in examing the multidimensional nature of resilient outcomes is pressing. Thus, in describing research findings, it is suggested researchers specify the particular areas to which their data apply and clarify that success in these domains by no means implies positive adaptation across all relevant areas (Cicchetti & Garmezy, 1993; Luthar & Zelazo, 2003). Circumscribed terms such as "educational resilience" (Wang, Haertel, & Wahlberg, 1994), "emotional resilience" (Kline & Short, 1991), "behavioral resilience" (Carpentieri, Mulhern, Douglas, Hanna, & Fairdough,

1993), "family resilience" (Walsh, 1998), and "community resilience" (Sonn & Fisher, 1998) are encouraged for use in order to bring precision to terminology used in the literature.

Developmental process represents another potential source of variation in childhood risk and resilience. Children may have different vulnerabilities and protective systems at different points in their development due to their maturational changes. Infants are highly vulnerable to mistreatment by their parents or caregivers. Yet, if they have proper food and care, they are less likely to experience the full negative impact associated with a war or a natural disaster because they lack an understanding of what is happening. As children mature, their broader environment, such as their school milieu and neighborhood, can increasingly affect them. Older children engage in more unsupervised activities and their involvement with peers and adults can be protective or risk enhancing. For example, while older children are much more capable of coping in the world on their own, they may be vulnerable to the exposure of negative influences such as violence. Research shows that among preschool and school-age children, exposure to community violence was associated with disturbance in sleep, poor concentration, anxiety, and depression (Marans & Adelman, 1997). Among highly stressed, disadvantaged fourth, fifth, and sixth graders who displayed high levels of antisocial behaviors, many reported that their peers offered them high social support (Dubow, Edwards, & Ippolito, 1997). Thus, the fluctuating nature of vulnerability may result from the interaction of individual and environmental conditions that change as children enter school, develop friendship networks, and explore their social milieu. To understand the complexity of the

developmental risks in childhood, it is essential to take into account spheres of influence in the environment of a child's life.

The effects of early adversity may not be displayed immediately, but may emerge much later in development. Early adversity, such as experiencing neglect or abuse, may impair a child's later ability to function successfully in intimate relationships. For example, survivors of child sexual abuse can display later interpersonal problems, including problems with intimate partner relationships, disturbed sexual functioning, and difficulties in parenting (DiLillo, 2001). On the other hand, in the Kauai study, Werner and Smith (1992) observed that most of the high-risk youth who developed serious coping problems in adolescence were described as resilient by the time they reached their early 30s. On the basis of this, it appears that both risk and resilience are not fixed attributes, but rather dynamic characteristics that change with social circumstances, time, and environmental context. The implication for research is clear: variation of developmental outcome across time and within context must always be considered. Both vulnerability and adaptation are time and context dependent.

Ecological Theory: A Multilevel Model of Child Development

Most child development theories posit that both a child's biology and his or her environment play a role in change and growth. Bronfenbrenner's (1979) ecological model of child development has provided a theoretical framework that is particularly well-suited for understanding the multilevel and interactive nature of risk and resilience (Felner, 2005; Fraser, 1997; Luthar et al., 2000, Luthar, 2003; Roberts & Masten, 2004). Bronfenbrenner's emphasis is placed on the importance of studying 'development-in-context', or the ecology of development. He argued that children's development is

strongly influenced by the family, school, peer, neighborhood, and community contexts in which they live.

In Bronfenbrenner's model, context is conceptualized as consisting of a number of nested levels varying in proximity to the individual. The "microsystem" is the environment in which the individual lives. This is the level closest to the child. Components of a microsystem include the child's family, peers, school, and neighborhood. At this level, relationships have impact in two directions. Parents affect a child's behavior and the child also affects the behavior of the parent. Because children's experiences in the microsystem most directly shape their views of the world and are incorporated into their beliefs about self, events in the microsystem have the greatest impact on children and play a decisive role in contributing to the development of resilience in children (Bronfenbrenner & Morris, 1998; Richman & Bowen, 1997).

The next level is the "mesosystem." This refers to the connections between the microsystems in which the individual directly participates. An important mesosystem for a child is the relationship between the child's teacher and his or her parents. As Richman and Bowen (1997) noted, "strong and positive connections between various microsystems provide a supportive context for the child's development; weak connections or the existence of value conflicts between various microsystems may place the child at a disadvantage for developing those attitudes and behaviors that are associated with developmental success" (p. 103).

The third level, "exosystem," refers to settings in which the individual does not participate directly but which do affect the individual indirectly. For example, a mother's workplace environment may affect her relationship with her husband and their child. The

child does not directly experience the mother's work environment, but he or she experiences the effects indirectly through the quality of parental care as it, parental care, is influenced by the work place environment.

The fourth level is the "macrosystem" which is the most distal level in the child's environment. The term macrosystem refers to "the general pattern of ideology and organization of social institutions in the society or subculture the individual is in" (Smith, Cowie, & Blades, 2003, p. 10). The effects of the large cultural setting defined by the macrosystem have a profound influence on the interactions of all other levels. For example, if a city's economic condition is weak, that city is less likely to have resources and support systems available for families and children in need. This, in turn, affects the functioning of many parents and children. Policies that tolerate families living in poverty, for instance, can place children at development risk and provide a poor environmental context for the development of resilience.

The fifth level, "chronosystem," involves the aspect of time as it relates to a child's environment. Elements within this system can be either external such as the timing of a parent' death, or internal, such as the physiological changes that occur as the child ages. With regard to sociocultural circumstances, women today are much more likely to be encouraged to pursue a career than they were 30 years ago. In ways such as these, the chronosystem can have a powerful impact on a child's development.

Bronfenbrenner's ecological model illustrates how a situation in the macrosystem (e.g., employment conditions) may affect the exosystem (parent's work experience) and therefore, a child's mesosystem (the connection between the child's parent and his or her teacher) and microsystem (the relationship between a child and his or her parents). These

levels interact with each other over time in shaping child development and adaptation. Factors present at one level influence outcomes in surrounding levels, thereby determining the extent of risk or protection posed to the child. By recognizing these complex connections, the ecological model suggests the importance of conceptualizing and designing investigations extending beyond just the microsystem level (Smith et al., 2003).

Since more proximal influences are most readily evaluated as affecting individual development, so far most research on child development is conducted at the level of microsystem. For example, the risk and resilience studies related to children's behavioral and emotional outcomes are mostly carried out within the family, school, and neighborhood settings. There is a paucity of research that has included exosystem and macrosystem variables as potential risk or protective factors or influential mechanisms in the development of risk and resilience.

The ecological theory provides a multilevel approach to examine and understand the complexity of child development within social contexts. Based on this person-in-environment model, a discussion of child outcomes include both behavioral and emotional indices of psychopathology as well as aspects of social competence, which are presented within the ecological framework.

Behavioral and Emotional Problems of Childhood

Nearly all children sometimes exhibit behavior that is problematic. Behavioral and emotional challenges may be experienced by typically developing children. However, the behavior and emotion of most children are different from the behavior and emotion of children who have emotional and behavioral disorders. Childhood behavioral

and emotional problems, such as hyperactivity-inattention, physical aggression-conduct disorder, indirect aggression, emotional disorder-anxiety, and property offences, can have a negative impact on others and the children themselves. Evidence suggests that behavioral and emotional problems starting early in life are likely to persist. Behavioral and emotional problems such as hyperactivity-inattention and conduct disorder are highly stable throughout the childhood years and are predictive of antisocial behavior, school drop-out, and criminality in adolescence (Campbell, 1995; Kazdin, 1997; Rubin, Steward, & Chen, 1995). Children with behavioral and emotional problems such as anxiety, withdrawal, and depression are at risk for adolescent problems of this nature. These behaviors also put children at risk for failing to develop the necessary social skills for healthy relationships with others in later life (Rubin et al., 1995). Moreover, behavioral and emotional problems are currently the most frequent reason for psychiatric referrals (Goldstein & Rider, 2005; Kauffman, 2005). These problems result in a tremendous cost to children, their families, and society in general. Most people agree that these behavioral and emotional problems should be prevented whenever possible.

Studies of behavioral types have generally found two major classifications. The first classification is referred to as externalizing problems. It is characterized by aggression, striking out against others, impulsivity, and delinquency. The second classification is called internalizing problems. It is characterized by anxiety, social withdrawal, and depression (Kauffman, 2005). Externalizing behaviors disrupt and disturb the immediate environment and are easily observed. Therefore, identification, assessment, and intervention are more likely to occur for children with externalizing behaviors than for children with internalizing behaviors. Manifestations of internalizing

behaviors are less visible to others and less likely to evoke the same negative reaction as externalizing behaviors. As a result, children with internalizing behaviors may go undetected and ignored until the problems become quite severe. It is important to recognize that externalizing and internalizing are not mutually exclusive. When they occur together, the child is at particularly high risk (Kauffman, 2005; Liu, 2004). In the context of the present study, hyperactivity-inattention, physical aggression-conduct disorder, and property offences are considered as externalizing problems. Indirect aggression and emotional disorder-anxiety are internalizing problems[2].

The Concept of Externalizing Behavior

Hyperactivity-Inattention

Problems in regulating attention and activity are commonly known as attention deficit-hyperactivity disorder (ADHD). ADHD is found to be more common in boys than girls and is thought to affect between 3 to 5% of the school-age population. It is one of the most common disorders of children and youth, and it is among the most common reasons for referral (Kauffman, 2005). Although parents often notice the start of this problem in toddlers, the disorder is usually diagnosed when the child is in elementary school. After this time, the disorder is usually stable throughout adolescence; symptoms tend to reduce in severity by late adolescence and adulthood, but problems tend to persist into adulthood. ADHD is frequently accompanied by other disorders such as conduct disorder and anxiety disorder (Goldstein & Rider, 2005; Kauffman, 2005).

The pattern of inattention, hyperactivity, and impulsivity in children often cause impairment in multiple settings, leading to problems with social relations, self-esteem,

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[2] The definitions used in this study for hyperactivity-inattention, physical aggression-conduct disorder, property offences, indirect aggression and emotional disorder are presented in Chapter 3.

and underachievement (Goldstein & Rider, 2005). In the context of school, ADHD often becomes intolerable, and the child's behavior is perceived as provoking a crisis. Children with ADHD exhibit social behavior about which teachers, parents, and peers are understandably upset. An inability to focus and persist interferes with classroom behavior, especially when tasks are repetitive or boring. These behavioral and emotional difficulties, unfortunately, present early and in particular when classroom expectations require sustained attention, effort, and goal-directedness. Because elementary school experience provides the basic foundational skills for learning, many youth with ADHD enter the junior high school years ill-prepared for the increasing demands of autonomy required by the upper grades. This then fuels their problems, leading to a cycle of increased risk for drop out, school failure, academic underachievement, and significant risk in transitioning successfully into adulthood (Barkly & Gordon, 2002).

It is has been known that ADHD is predictive of later antisocial behavior (Lilienfeld & Waldman, 1990; Liu, 2004). As mentioned above, children with ADHD have an increased likelihood of becoming criminal in adulthood. In an early study, Satterfield, Hoppe, and Schell (1982) showed that 58% of ADHD children were arrested in adulthood compared with 11% in a control group. In a prospective follow-up of 103 hyperactive children ages 6 to12 years, Mannuzza, Klein, Konig, and Giampino (1989) found that rates of arrest for criminal offenses were 39% compared with 20% for matched controls, a statistically significant difference. They replicated this finding 2 years later (Mannuzza et al., 1991) in an independent sample of 94 hyperactive boys and found a rate of 32% for antisocial disorders in adulthood compared with 8% in controls.

ADHD limits the potential for children to develop critical and resilient phenomena. This includes the ability to connect and maintain satisfying reciprocal relationships with others, achieve in school, and maintain mental health to facilitate resilience (Brooks & Goldstein, 2001).

Physical Aggression-Conduct Disorder and Property Offences

Conduct disorder (CD) is characterized by persistent antisocial behavior that violates the rights of others as well as age-appropriate social norms (APA, 2001). It includes aggression towards people and animals, destruction of property, deceitfulness and theft, and serious violation of rules. Compared to nonaggressive youngsters, children and youth with CDs typically show age-inappropriate aggression from an earlier age, exhibit aggression across a wider range of social situations, and persist in aggressive behavior for a longer time (Kauffman, 2005).

CD is often comorbid with other disorders, such as ADHD. It is one of the most common and serious psychopathological disorders of childhood and youth. Estimates of the prevalence of CD range from 6 to 16% of boys and 2 to 9% of girls under the age of 18. The average age of CD is younger in boys than in girls. Boys may meet the diagnostic criteria for CD by age 12, whereas girls often reach 14 to 16 before the diagnosis is made (Goldstein & Rider, 2005). While boys with CD tend to engage in fighting, stealing, vandalism, and other overtly aggressive and disruptive behavior, girls are more likely to exhibit lying, truancy, running away, substance abuse, prostitution, and other less overtly aggressive behavior (Kauffman, 2005). A significant percentage of children and adolescents with CDs showed the characteristics of oppositional defiant behavior (ODD) prior to being diagnosed with CD. They displayed a pattern of negativistic, hostile, and

defiant behavior that is uncharacteristic of the normally developing children of the same age (Hinshaw & Lee, 2003). The risk of onset of CD was found to be four times higher in children with ODD than in those without (Cohen & Flory, 1998). ODD, ADHD and CD are known to be closely linked, although having one of these disorders does not necessarily mean that a child will have the other.

The Concept of Internalizing Behavior

Indirect Aggression

Indirect aggression is aggression not aimed directly at someone but is routed via a third party. Examples of indirect aggression would be telling bad or false stories, becoming friends with another as an act of revenge, or social exclusion. This form of aggression involves the manipulation of relationship patterns and is intended to damage another's self-esteem or social status (Smith, Cowie, & Blades, 2003). Harm to others occurs through social exclusion and the spreading of rumors employed as methods of retaliation. The prevalence of indirect aggression has not been estimated precisely. Beginning with the preschool years and extending into adolescence, girls display more indirect aggression than boys (Crick & Grotpeter, 1995; Galen & Underwood, 1997).

Emotional Disorder-Anxiety

Anxiety, the distress, tension, or uneasiness that goes with fears and worries, is part of the normal development of young children. However, extreme anxiety and fear can be seriously debilitating. Anxiety disorder is generally more transient and is associated with lower risk for adulthood psychiatric disorder than are behaviors related to externalizing disorders (Kauffman, 2005). Nevertheless, in its extreme forms, anxiety disorder does result in serious impairment of functioning. Extreme social isolation,

extreme and persistent anxiety, and persistent extreme fears, for example, can seriously endanger social and personal development. Moreover, anxiety is frequently comorbid with depression and learning disabilities (Barrios & O'Dell, 1998). Excessive anxiety may characterize 2 to 5% of the child population. Anxiety disorder may be part of the problems of 20 to 30% of youngsters referred to clinics for treatment of behavioral and emotional problems. Boys and girls are affected about equally (Kauffman, 2005). Emotional disorder-anxiety is likely to have onset within the age range from 8 to 10 years old (Wilmshurst, 2005).

Factors that Influence Childhood Behavioral and Emotional Problems

Because of its significant consequence, childhood externalizing and internalizing problems have been extensively studied. Research has identified several factors that influence the onset of those problems. These factors can be divided into two categories: (1) interpersonal or individual factors and (2) contextual or community factors. Individual factors are associated with the child's personal environment, including individual psychosocial and biological characteristics and family conditions. Contextual factors are associated with the structure and values within the individual's social environment and peer group, such as characteristics of neighborhood (Williams, Ayers, Van Dorn, & Arthur, 2003). Consistent with ecological theory, the classification outline reflects the idea that a child's social ecology consists of many different systems, each of which has the capacity to influence developmental trajectories.

Biological or Genetic Factors

Research literature suggests that biological and congenital predispositions for childhood behavioral and emotional problems exist (Goldstein & Rider, 2005; Kauffman,

2005; Liu, 2004). Among the many biological factors that may contribute to the origins of emotional or behavioral disorders are genetics, gender, brain damage or dysfunction, malnutrition, and temperament.

Children inherit predispositions to certain behavioral characteristics from their parents. Genetic factors have been suggested as a cause of emotional and behavioral difficulties, including criminality, attention deficits, hyperactivity, antisocial behavior, conduct disorder, depression, and anxiety disorder (Asarnow & Asarnow, 2003; Kauffman, 2005; Levy & Hay, 2001). The fact that a disorder has a genetic cause does not mean that the disorder is untreatable.

As mentioned above, attention deficits, hyperactivity, and conduct disorder occur at a much higher rate in boys than in girls. Generally, girls tend to show indirect aggression while boys show physical aggression. It is not clear whether the differences for gender are caused by behavioral influences or by differences in socialization that result in different expectations for boys and girls (Willams et al., 2003).

Brain damage or dysfunction has also been suggested as a cause of nearly every type of behavioral and emotional disorder. Learning disabilities and the related problems of hyperactivity, impulsivity, and inattention have historically been believed to be caused by brain injury or dysfunction, although the exact nature of the injury or dysfunction has not been clear (Hallahan, Lloyd, Kauffman, Weiss, & Martinez, 2005). According to Bower (1995), subtle brain injury before, during, or shortly after birth is an important contributing cause of serious juvenile delinquency and adult criminality.

Severe malnutrition can have devastating effects on young children's cognitive and physical development (Tanner & Finn-Stevenson, 2002). It is well recognized that

hunger and inadequate nutrition interfere with the ability to concentrate on academic and social learning. Thus, the concern for children's inadequate nutrition in poor families is well justified.

Temperament is a consistent behavioral style or predisposition to respond in certain ways to one's environment (Kauffman, 2005). A difficult temperament characterized by irritability, high activity level, short attention span, distractibility, and less adaptability to change has been suggested as a possible starting point for ADHD and CD. Evidence suggests easygoing temperaments are generally protective for long-term adaptation (Luthar, 1999; Werner & Smith, 1992; Wyman, Cowen, Work, & Parker, 1991). Infants who were viewed as good-natured and active tend to be among those children who later display resilience in psychosocial outcomes (Werner & Smith, 2001; Wyman et al., 1991). Similarly, with school-aged children in poverty, Smith and Prior (1995) found that teacher's ratings of positive temperament were among the best discriminators of resilient function across multiple behavioral domains.

Family Risk Factors

Families are best defined by their function. They provide protection, regulation, knowledge, affect, and self understanding to children. Several aspects of child-rearing practices, such as degree of involvement, parent-child conflict management, monitoring, and harsh and inconsistent discipline, have been correlated with children's externalizing behavior such as conduct disorder and antisocial behavior (Fricke, 1994; Wasserman, Miller, Pinner, & Jaramilo, 1996). Coercive parenting behaviors appear to lead to aggressive behaviors in both boys and girls (Eddy, Leve, & Fagot, 2001). However, family characteristics seem to predict emotional and behavioral development only in

complex interactions with other factors, such as socioeconomic status, sources of support outside the family, the child's age and gender, and the child's temperamental characteristics. For example, children, especially boys who display aggressive and antisocial behavior have been found to be more likely to come from poor families in which the parents are suffering from depression (Luthar, 1999). In this case, poverty exerts a direct contextual influence on children and their families.

Larger family size has been repeatedly shown to be a risk factor for delinquency and conduct disorder (Kauffman, 2005), however, the importance of family size as a predictor is moderated by income. If family income and living accommodations are adequate, family size is less likely to be a risk factor (Kazdin, 1997).

There is evidence for associations between the quality of siblings' relationships and their externalizing and internalizing behavior (Dunn, 2002). Longitudinal research following children from the preschool period to early adolescence has demonstrated that not only externalizing behavior but also internalizing problems in middle childhood and adolescence were more common among children whose siblings had been very negative and hostile to them during their preschool years (Dunn, Slomkowski, Beardsall, & Rende, 1994). Differential parent-child relationships have also been found to be related to children's adjustment outcome. Volling and Elins (1998) found that preschool aged siblings showed greater internalizing and externalizing symptoms when both mothers and fathers disciplined them more than their younger siblings.

Single-parent household status (most often in reality, single-mother household status) exacerbates the already difficult situation faced by children who live in poverty. Several studies have shown that poor children of single mothers are vulnerable across

many aspects of psychological adjustment (Lipman, Offord, Dooley, & Boyle, 2002; Luthar, 1999; McLanahan, 1997). According to Luthar (1999), even after considering income levels, children are at elevated risk for problems in emotional, behavioral, and academic adjustment, with risks particularly high among children of never-married or divorced mothers.

The findings from other studies (Dooley, Curtis, Lipman, & Feeney, 1998; Downey, 1994; Ho & Willms, 1996; Lipman & Offord, 1997; Lipman et al., 2002), however, have suggested that the strength of association between single-parent household status and child emotional, behavioral, academic, and social outcomes decreases when the influence of income is taken into account. The effect of single-parent family status on children's outcomes diminishes further when other indicators of SES, such as parental education and employment, are included in addition to family income. This suggests that at least some of the negative effect on children's outcomes is associated with having a lower family income, or low SES, rather than having only one parent in the family.

Research suggests that parental modeling, reinforcement, and punishment of specific types of behavior explain how families influence children's behavioral and emotional development. For example, children who demonstrate high levels of anxiety often have families in which caution and avoidance are modeled and reinforced. In such instances, parents may reward avoidance of risk and social disengagement and thereby foster the development and expression of fear and anxiety (Dadds, 2002).

Poverty in Childhood

Poverty, including low SES, may directly affect children by increasing the potential that a child will lack adequate food, clothing, shelter, and other basic

necessities. It may have indirect effects on children by placing them in a position of possible exposure to such risks as medical illnesses, family stress, inadequate social support, and parental depression, which in turn, may place the child at risk of behavioral and emotional difficulties. Studies have shown that economic hardship is both correlated with parental psychological distress and poor family management practice (Duncan & Brooks-Gunn, 1997; Lamer & Collins, 1996).

Poverty is also associated with unsupportive, unstimulating, and chaotic home environments (Hart & Risley, 1995). Evidence suggests these types of environments are often associated with an increased risk for internalizing problems, such as depression and anxiety (Lynch & Cicchetti, 1998; Luthar, 1999), and externalizing problems including aggression, delinquency, and antisocial behavior (Herrenkohl, Egolf, & Herrenkohl, 1997). Several studies involving children in poverty have shown that, early in development, boys are more vulnerable than girls in relation to disturbances in family functioning (Bolger, Patterson, Thompson, & Kupersmidt, 1995; Shaw, Vondra, Hommerding, Keenan, & Dunn, 1994; Wall & Holden, 1994). During the preschool period, boys who were exposed to high maternal anger and depression, display more adjustment difficulties than girls (Wall & Holden, 1994). Boys often display externalizing symptoms such as physical aggression, rather than internalizing ones such as depression or anxiety (Bolger et al., 1995; Luthar, 1999).

Given their limited defenses and coping resources, younger children are particularly vulnerable to experiences of chronic poverty (Luthar, 1999). Younger children tend to show higher levels of emotional distress than their older counterparts (McGee, Feehan, Williams, & Anderson, 1992). Experiences of chronic poverty during

early childhood inhibit subsequent educational outcomes as well as employment during adulthood, to a greater degree than exposure to poverty in later childhood years (Coleman & Karraker, 1998; Duncan & Brooks-Gunn, 1997).

Poverty has a collective effect. Collective poverty is a central element in neighborhood disadvantage. Neighborhood disadvantage consists of a multidimentional cluster of characteristics, such as high unemployment rates, high crime and violence rates, poor living conditions, frequent resident mobility, cultural conflicts, broken families, and restricted access to resources. Each of these contributes independent explanatory power to externalizing problems among children (Goldstein & Rider, 2005). Often, these characteristics group together to form a contextual stress in disadvantaged neighborhoods. Research suggests that, delinquency and conduct disorder among children are particularly associated with poor and disadvantaged neighborhoods (Fraser et al., 2003; Williams et al., 2003).

Neighborhood disadvantage may also be associated with undesirable developmental outcomes. In a sample of 5-year-olds, Duncan, Brooks-Gunn, and Klebanov (1994) found more externalizing aggressive behavioral and emotional problems among children who had a higher percentage of low-income neighbors. They also found neighborhood income differences were significant determinants of children's IQ at age five even after controlling for a variety of family variables. In predicting academic functioning, Herrenkohl, Guo, Kosterman, Hawkins, Catalano, and Smith (2001) found that adolescents in affluent neighborhoods tend to drop out of school less frequently and complete more years of school than adolescents in less-advantaged

neighborhoods. Such findings suggest access to high quality school, health care, and positive role models can benefit developmental competence and prevent social problems.

Many researchers agree that the effects of poverty are mediated, at least in part, by variables at the family and individual levels (Duncan, Brooks-Gunn, & Smith, 1998; Felner, 2005; Kirby & Fraser, 1997; Luthar, 1999). For example, Felner, Brand, DuBois, Adan, Mulhall, and Evans (1995) conducted an extensive study (N = 398) that investigated three aspects of the proposed mediated pathway simultaneously: socioeconomic household disadvantage, proximal environmental conditions (e.g., family, school, and social support received from family and friends), and early adolescent (Grades 7-9) emotional and academic adjustment. Their sample was predominantly from a poor rural area of the Southeastern United States. Findings indicated that levels of disadvantage were related to both emotional and academic adjustment. Among youth whose families were economically or socially disadvantaged, those who were from homes in which adults were employed in low-income, unskilled occupations were found to have lower levels of school performance and achievement compared to those from homes in which adults were employed in higher paying semiskilled or skilled/professional occupations. Further, youth from families in which neither parent had graduated from high school exhibited significantly poorer emotional and academic adjustment than did those whose parents had higher educational levels. Youth from families where there was more serious economic hardship experienced more problematic parenting, felt less connected to school, and had greater exposure to stressful life events. Felner et al. (1995) suggested that levels of parental education can be related to relatively greater or lesser levels of risk or resilience among students. Moreover, SES which is a

complex measure of economic, educational, and occupational position differs from that of poverty or low income, although, the two indicators – poverty and low SES – may operate similarly to place children at risk (Felner, 2005; Hollingshead, 1975; Kirby & Fraser, 1997). Low SES may increase family stress, which can lead to inconsistent parenting and which, in turn, can place children at risk of behavioral and emotional difficulties. Thus, in conceptualizing the effect of poverty on childhood, researchers are encouraged to think in terms of linkages between and across individual, family, school, and neighborhood risk and protective factors (Felner, 2005; Kirby & Fraser, 1997; Luthar, 1999).

Broad Environmental Risk Factors

The environment is the context for child development. It provides children with opportunities to learn. When the environment is impoverished, children suffer. Research has shown that social environmental factors such as inaccessible and unaffordable health and child care, high rates of neighborhood crime and violence, high population density, and the lack of social cohesion are related to juvenile participation in delinquent behavior (Sampson, Raudenbush, & Earls, 1997; Thomlison, 2003; Williams et al., 2003). Neighborhoods with high residential mobility usually have higher rates of juvenile crime (Wison & Herrnstein, 1985), and when neighborhoods undergo rapid residential shifts, victimization and crime increase (Sampson & Laub, 1994). Parental education, employment, and health, on the other hand, appear to protect children who live in poor, high-crime urban neighborhoods from behavioral and emotional problems (DuRant, Getts, Cadenhead, Emans, & Woods, 1995). DuRant and colleagues found teenagers who lived in households headed by persons with higher education reported fewer feelings of

depression and hopelessness. Parental employment was correlated with higher scores on purpose in life. In turn, these more optimistic adolescents were less likely to engage in violent behavior.

There is increasing evidence that aspects of the community may play an important role in buffering risk for children (Letourneau, Drummond, Fleming, Kysela, McDonald, & Stewart, 2001; Sampson, 2001). Studies suggest that social support, neighborhood social organization, and community networks have an influence on family functioning and its relation to risk (Drummond, Fleming, McDonald, & Kysela, 2005; Gorman-Smith & Tolan, 2003). For example, in a study of parenting among single mothers in poor urban neighborhoods, Furstenberg (1993) found that those residing in the most dangerous neighborhoods adapted by isolating themselves and their families. Although this served to increase the mothers' sense of safety, it also cut them off from potential social support. However, it is apparent that more research is needed to determine the risk and protective factors of community characteristics. For instance, few studies have investigated the relationships between city characteristics such as unemployment rate, divorce rate, percentage of immigrants, percentage of migrants, population size, and percentage of low family income and behavioral and emotional problems in children.

Social Competence: the Focus on Prosocial Behavior

At the opposite end of the spectrum from behavioral and emotional problems is prosocial behavior. Prosocial behavior refers to those behaviors that are cooperative in nature and include friendship, empathy, altruism, and helping behavior (Reber, 1995). Research shows that children who help others tend to have positive relationships and interactions with their peers (Eisenberg & Fabes, 1998), and people who were prosocial

as children are less likely to be antisocial as adults (Hamalaimen & Pulkiinen, 1995). In a longitudinal study of 294 children, Caprara, Barbaranelli, Pastorelli, Bandura, and Zimbardo (2000) found that a composite score of prosocial behavior in the third grade as rated by self, peers, and teacher significantly predicted both academic achievement and social preference five years later when children were in grade 8. The implications of these findings are that, in the context of a reciprocated friendship, peers bond to each other around social and academic activities, and together they create a healthy environment that is conducive to academic learning. Therefore, prosocial behavior is considered as desirable and has been encouraged in children by society. Children who have difficulties in these areas may not be accepted by others in school or social settings. Prosocial behavior is crucial in fostering positive and healthy social relationships. The development and employment of prosocial behavior in children, therefore, have been seen by many researchers as a pathway to social competence, one of the most frequently identified attributes of resilient children as well as a significant predictor of academic success and positive life outcomes (Masten & Powell, 2003; Parrila, Ma, Fleming, & Rinaldi, 2002).

It is widely believed that girls are more prosocial than boys (Grusec, Davidov, & Lundell, 2002; Vasta, Miller, & Ellis, 2004). There is little empirical support for a gender difference in prosocial behavior, although girls tend to display more empathy and concerns for others, but are not more inclined to share, comfort, or help. The gender difference is largest on self-report measures (Eisenberg & Fabes, 1998; Grusec et al., 2002; Vasta et al., 2004). As children grow older, both the frequency and sophistication of helping increase. With age, children are more likely to express their concerns verbally,

provide help, or ask an adult to intervene. Compared with younger children, older children and adolescents are more likely to help even at some cost to themselves, perhaps because older children are better able to recognize possible physical, psychological, or moral gains from assisting others (Eisenberg & Fabes, 1998).

Many factors contribute to the development of prosocial behavior. It is believed that genes influence prosocial development through temperament (Grusec et al., 2002; Zahn-Waxler, Robinston, & Emde, 1992). But prosocial behavior is also strongly influenced by different socialization experiences and the interaction of these experiences with biological givens. The effects of parental characteristics and childrearing practices have been linked to empathic responding. Mothers who are empathic, who score high on perspective-taking tasks and who respond sensitively to their children's needs are more likely to have children who are high in empathy towards others. There are clear links between secure parent-child attachment and securely attached children who demonstrate greater empathy towards their peers (Smith et al., 2003).

Experiences with siblings are also important in promoting prosocial behavior. Dunn, Brown, and Beardsall (1991) followed up the siblings who had been observed as preschoolers. They found that there were links between the quality of the relationships between the siblings in the preschool period and the children's behavior at a later stage. Those who had grown up with a sibling who was unfriendly or aggressive were more likely as adolescents to have emotional difficulties in their relationship with others than were those whose siblings had been warm and affectionate towards them. Children who perceived that their sibling was receiving more attention and affection from the mother were more likely to show aggressive or difficult behavior in childhood and adolescence.

It appeared that relative differences in how loved a child feels have an influence on how socially adjusted they are.

Communities with high levels of employment, effective schools, and sufficient resources and services are more likely to have stable and cohesive neighborhoods. These reinforce children's coping and provide opportunities for involvement with positive peer models, supportive neighbors, teachers, and other prosocial adult role models. Research suggests that, when the context for child development is characterized by many opportunities for involvement, children, including those at high risk, may be motivated to do well in school, to resist negative peer influences, and to engage in other prosocial behaviors (Fraser et al., 2003). Variables likely to influence the development of prosocial behavior at the community level are still unknown. Previous research indicates social environmental factors such as neighborhood poverty and violence increase the likelihood of behavioral and emotional problems in children (Goldstein & Rider, 2005; Luthar, 1999), but what factors associated to healthy development of prosocial behavior at community level is unclear. More research is needed.

Summary

Identifying the common factors that produce risk and resilience in children is a first step both in conducting an ecologically-based assessment and in designing ecologically-focused services. Although the effect of several individual, family, school, and community level factors on childhood behavioral and emotional problems and prosocial skills have been previously studied, there is a paucity of empirical research that has investigated them in combination. Factors that are related to city characteristics are missing. By examining the simultaneous contributions of multiple factors related to the

different behavioral and emotional outcomes, several important questions can be explored. These include: What factors contribute to the childhood behavioral and emotional problems? What factors are associated with healthy development of prosocial behavior? What combination of factors are particularly beneficial? Can city level factors exert influence over and above the individual factors? This exploratory study, therefore, was an attempt to provide some answers to these questions.

CHAPTER 3

METHODOLOGY

The purpose of the present study was to explore how social and economic characteristics of a city influence the outcomes of Canadian children within socially disadvantaged families. Six behavioral and emotional outcome variables were considered: prosocial behavior, hyperactivity-inattention, physical aggression-conduct disorder, indirect aggression, emotional disorder-anxiety, and property offences. These dependent variables were obtained from the first cycle of the National Longitudinal Survey of Children and Youth (NLSCY). Each variable was separately investigated using the hierarchical linear model (HLM) technique with the independent variables derived from the NLSCY and the 1996 census data gathered from 25 Canadian major cities. A two-level hierarchical linear model (HLM) was developed with children at the first level and cities at the second level.

Sample of the Study

The National Longitudinal Survey of Children and Youth (NLSCY) was conducted by Statistics Canada in 1994-1995 on behalf of Human Resources and Development Canada (HRDC) in order to measure child development and well-being. The first cycle of the NLSCY resulted in a national sample of 13,439 households. In these households 22,831 children aged up to 11 years were selected to participate in the survey. These children came from (a) rural areas, (b) urban centers (41 cities with a population between 10,000 and 100,000), and (c) census metropolitan areas (CMA, 25 major cities with population at least 100,000). For the purpose of this study, the sample was taken from 4,962 children in the 4 to 11 year-old-age group who lived in the 25

major cities. This is the age group used by the NLSCY to investigate the six behavioral and emotional outcome variables that were considered. Within this group, there were 2,362 children who came from low SES families.

Description of Variables

Six behavioral and emotional outcomes derived from the NLSCY data were examined as dependent variables. The independent variables were measured at two levels: child-level (level 1) and city-level (level 2). These independent variables included six child-level variables derived from the NLSCY data, and eleven city-level variables derived from the 1996 Census data. The description of the dependent and independent variables used in this study is given below.

Dependent Variables

The six dependent variables were prosocial behavior, hyperactivity-inattention, conduct disorder-physical aggression, indirect aggression, emotional disorder-anxiety, and property offences. In the NLSCY these six dependent variables were measured using behavior scales for children between 4 and 11 years of age. The objective of these scales was to assess aspects of the behavior of children. According to Statistics Canada (1996), scales were selected that had been used in other studies where the psychometric properties of the measures produced by the scale were available with complete references.

There were three major steps in the analyses of the scale data. First, a factor analysis was performed on all scales to determine the constructs or factors inherent in each scale. Secondly, scale scores were calculated based on this factor structure. Lastly, reliability measures were produced. Cronbach's alpha is 0.82 for prosocial behavior (on a

scale of 0 to 20), 0.84 for hyperactivity-inattention (on a scale of 0 to 16), 0.79 for emotional disorder-anxiety (on a scale of 0 to 16), 0.77 for conduct disorder- physical aggression (on a scale of 0 to 12), 0.64 for property offences (on a scale of 0 to 12), and 0.78 for indirect aggression (on a scale of 0 to 10). In all these scales, a higher score indicated an increased presence of the behavior. The following are detailed descriptions of these six behavior scales:

Prosocial behavior was measured through an equally weighted factor score which consisted of 10 items from which the PMK (Person most knowledgeable about the child in the household) chose to answer the following question: How often would you say that your child: (a) Shows sympathy to someone who has made a mistake? (b) Will try to help someone who has been hurt? (c) Volunteer to help clear up a mess someone else has made? (d) If there is a quarrel or dispute, will try to stop it? (e) Offers to help other children (friend, brother or sister) who are having difficulty with a task? (f) Comfort a child (friend, brother or sister) who is crying or upset? (g) Spontaneously helps to pick up objects which another child has dropped (e.g., pencils, book, etc.)? (h) Will invite bystanders to join in a game? (i) Helps other children (friend, brother or sister) who are felling sick? (j) Takes the opportunity to praise the work of less able children? The three response options were: 1 = Never or not true, 2 = Sometimes or somewhat true, and 3 = Often or very true. In the calculation of the factor scores for this prosocial behavior factor, the choices were rescaled so that the choice "never or not true" was scored as 0, the choice "sometimes or somewhat true" was scored as 1, and the choice "often or very true" was scored as 2. These values were summed across the 10 items resulting in a prosocial behavior score that ranged from 0 to 20. A score of 0 represents the absence of

a prosocial behavior and a score of 20 is the highest possible score with respect to a prosocial behavior. A high score indicates more prosocial behavior.

Hyperactivity-inattention was measured using an equally weighted factor score derived from eight items answered by the PMK: How often would you say that your child: (a) Can't sit still, is restless or hyperactive? (b) Is distractible, has trouble sticking to any activity? (c) Fidgets? (d) Can't concentrate, can't pay attention for long? (e) Is impulsive, acts without thinking? (f) Has difficult awaiting turn in games or groups? (g) Can't settle to anything for more than a few moments? (h) Is inattentive? The choice of answers was: 1 = Never or not true, 2 = Sometimes or somewhat true, and 3 = Often or very true. In the calculation of the scores for this hyperactivity-inattention factor, the choices were rescaled from 0 to 2. The choice "never or not true" was scored as 0, the choice "sometimes or somewhat true" was scored as 1, and the choice "often or very true" was scored as 2. These values were summed across the 8 items resulting in a hyperactivity-inattention behavior score range from 0 to 16. A score of 0 represents the absence of a hyperactivity-inattention behavior and a score of 16 is the highest possible score with respect to a behavior of hyperactivity-inattention. A high score indicates more hyperactive/inattentive behavior.

Conduct disorder-physical aggression was measured using an equally weighted factor score which consisted of six items that the PMK answered: How often would you say that your child: (a) Gets into many fights? (b) When another child accidentally hurts him/her (such as by bumping into him/her), assumes that the other child meant to do so? (c) Physically attacks people? (d) Threatens people? (e) Is cruel, bullies, or is mean to others? (f) Kicks, bites, hits other children? The choice of answers was: 1 = Never or not

true, 2 = Sometimes or somewhat true, 3 = Often or very true. Again, the choices were rescaled to from 0 to 2. These values were summed across the 6 items resulting in a conduct disorder score range from 0 to 12. A score of 0 represents the absence of a conduct disorder and a score of 12 is the highest possible score with respect to a behavior of conduct disorder. A high score indicates more frequent behavior associated with conduct disorder and physical aggression.

Indirect aggression was measured using an equally weighted factor score which consisted of five items that the PMK answered: How often would you say that your child: (a) Tries to get others to dislike that person? (b) Becomes friends with another as revenge? (c) Says bad things behind the other's back? (d) Says to others: Let's not be with him/her? (e) Tells the other one's secrets to a third person? The choice of answers was: 1 = Never or not true, 2 = Sometimes or somewhat true, and 3 = Often or very true. Again, the choices were rescaled from 0 to 2. These values were summed across the 5 items resulting in an indirect aggression score ranged from 0 to 10. A score of 0 represents the absence of an indirect aggression behavior and a score of 10 is the highest possible score with respect to an indirect aggression behavior. A high score indicates more behavior associated with indirect aggression.

Emotional disorder-anxiety was measured using an equally weighted factor score which consisted of eight items. How often would you (the PMK) say that your child: (a) Seems to be unhappy, sad, or depressed? (b) Is not as happy as other children? (c) Is too fearful or anxious? (d) Is worried? (e) Cries a lot? (f) Appears miserable, unhappy, tearful, or distressed? (g) Is nervous, highstrung or tense? (h) Has trouble enjoying himself/herself? The choice of answers was: 1 = Never or not true, 2 = Sometimes or

somewhat true, and 3 = Often or very true. Again the responses were rescales from 0 to 2. These values were summed across the 8 items resulting in an emotional disorder-anxiety score that ranged from 0 to 16. A score of 0 represents the absence of this problem and a score of 16 is the highest possible score with respect to this problem. A high score indicates a greater presence of behaviors associated with anxiety and emotional disorder.

Property offences was measured through an equally weighted factor score which consisted of six items that the PMK answered: How often would you say that your child: (a) Destroys his/her own things? (b) Steals at home? (c) Destroys things belonging to his/her family or other children? (d) Tells lies or cheats? (e) Vandalizes? (f) Steals outside the home? The choice of answers was: 1 = Never or not true, 2 = Sometimes or somewhat true, and 3 = Often or very true. Again, the responses were rescaled from 0 to 2. These values were summed across the 6 items resulting in a property offences score ranged from 0 to 12. A score of 0 represents the absence of a property offences behavior and a score of 12 is the highest possible score with respect to a property offences behavior. A high score indicates more behavior associated with property offences.

Independent Variables

The independent variables included 6 child-level variables and 11 city-level variables as predictors in the HLM analyses. The child-level variables were derived from the NLSCY, and included child's age (age), gender of child (gender), socio-economic status of the parents (SES), child's single parent status (number of parents), siblings of the child in the household (number of siblings), and persons in the household (family size). Gender was recoded as female = 1 and male = 0. Number of parents was recoded as

single parent = 1 and both parents = 0. The child-level variables were chosen based on the literature review presented in Chapter 2.

The NLSCY offered no information on characteristics of the 25 cities. To overcome this limitation, the 1996 census data was used to generate city information. Based on the Chapter 2 literature review, 11 city-level variables were selected for this study. They were: 1996 population size, percentage of the total population between 15 and 64 years of age, divorce rate, percentage of immigrants, unemployment rate, percentage of labor force working in health, percentage of labor force working as teachers and professors, percentage of labor force working as childcare and home support workers, percentage of population 15 years and over with post-secondary education, percentage of migrants, and percentage of low economic families income. Following is a detailed description of these variables:

1996 population size is the number of people in each of 25 cities in the year 1996.

Percentage of the total population between 15 and 64 years of age is measured as the total population aged 15 to 64 years divided by the 1996 population size.

Divorce rate is measured as a percentage of divorced population divided by the total population 15 years and over by legal marital status.

Percentage of immigrants is measured as the number of immigrants divided by population size.

Unemployment rate is measured as the total unemployed population divided by the total population in the labour force.

Percentage of labor force working in health is measured as the total number of people in health occupations divided by the total labour force.

Percentage of labor force working as teachers and professors is measured as the total number of teachers and professors divided by total labour force.

Percentage of labor force working as childcare and home support workers is measured as total number of childcare and home support workers divided by the total labour force.

Percentage of population 15 years and over with post-secondary education is measured as the total population with bachelor's degrees or higher divided by the total population 15 years and over.

Percentage of migrants is measured as the total number of migrants divided by population size.

Percentage of low economic family income[3] is the percentage of economic families in a given classification below the low income cut-offs.

Treatment of Missing Data

One of the problems encountered when attempting to conduct statistical analyses with survey data is that usually not all participants provide answers to all questions. Although the percentage of respondents with data missing on any particular question may be small, there is usually a large percentage who have not answered every question. Most statistical software packages offer two options for handling missing data in regression analyses: listwise and pairwise deletion. The listwise method employs data for those respondents with complete data for every variable in the analysis. Those with missing data on any variable are deleted. The pairwise method constructs a correlation matrix using all available data for each pair of variables considered separately; regression

[3] Economic family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption.

coefficients are then based on this correlation matrix. When the sample size is large, and the proportion of respondents with missing data is small, both methods will provide accurate estimates (Willms, 1992). In the case of this study, listwise deletion was used to handle missing data prior to entering data into the HLM 5.05 program at both level 1 and level 2. This decision was made based on the recommendation of Raudenbush, Bryk, Cheong, and Congdon, Jr. (2000). A listwise deletion was done with the children in the 4 to 11 age group of the NLSCY data. This reduced the sample size from 4,962 to 4,566. The number of low SES children in the final sample was 2,362. Since the deleted data was randomly scattered in the sample distribution and the percentage of data was small, the major characteristics of the NLSCY sample were maintained.

Statistical Procedures

Social data are often hierarchical, as in the case of this study with children nested within cities. In order to accommodate this data hierarchy, hierarchical linear modeling (HLM) was employed to analyze each of the six behavioral and emotional outcomes. Specifically, a two-level HLM model with children at the first level and cities at the second level was developed for each dependent variable.

Two multilevel models (the "null" model and the "full" model) were tested for each dependent variable in three stages:

Stage 1: The "null" model, which contained only the outcome variable (as the dependent variable), and no independent variables at either the child or the city level, was analyzed first. This model is equivalent to a one-way ANOVA with random effects. In this case, the level 1 or child-level equation was:

$$Y_{ij} = \beta_{0j} + r_{ij}, \quad (1)$$

where each level-1 error, r_{ij}, was assumed to be normally distributed with a mean of zero and a constant level-1 variance, σ^2; Y_{ij} was the outcome measure for the ith child at the jth city. Notice that this model predicted the outcome within each level-1 unit with just one level-2 parameter, the intercept, β_{0j}. In this case, β_{0j} was the mean outcome for the jth city.

At level-2 or the city-level, each city's mean outcome β_{0j} was represented by the grand mean, γ_{00}, plus a random error, u_{0j}:

$$\beta_{0j} = \gamma_{00} + u_{0j}. \qquad (2)$$

where γ_{00} was the grand mean outcome in the population, and u_{0j} was the random effect associated with city j and was assumed to have a mean of zero and variance τ_{00}.

Substituting Equation (2) into Equation (1), the combined model becomes:

$$Y_{ij} = \gamma_{00} + u_{0j} + r_{ij}.$$

where

- γ_{00} is the grand mean;
- u_{0j} is a group (level-2) effect, or the group's deviation from the grand mean; and
- r_{ij} is a child (level-1) effect, or the individual's deviation from the grand mean.

Estimating the one-way ANOVA model is often useful as a preliminary step in a hierarchical data analysis (Raudenbush & Bryk, 2002). It is important because it provides the point estimate and confidence interval for the grand mean, γ_{00}. More important, it provides information about the outcome variability at each of the two levels. Given the combined model above, the total variance of Y can be decomposed as the sum of the level-2 and the level-1 variances,

$$Var(Y_{ij}) = Var(u_{0j} + r_{ij}) = \tau_{00} + \sigma^2.$$

The covariance between two individuals (i and i', with $i \neq i'$) in the same group j is equal to the variance of the contribution u_{0j} that is shared by these individuals,

$$Cov(Y_{ij}, Y_{i'j}) = Var(u_{0j}) = \tau_{00}.$$

Their correlation, $\rho(Y_{ij}, Y_{i'j}) = \tau_{00} / (\tau_{00} + \sigma^2)$, is the intraclass correlation coefficient ρ, which can be interpreted in two ways: it is the correlation between two randomly drawn individuals in one randomly drawn group, and it is also the fraction of total variability that is due to the group level.

In this study, the null model functioned to partition variance in the outcome measure into within-city (between-child) and between-city components. Results of this variance partition and the estimation of the grand mean were used to answer the first and second research questions.

Stage 2: A child-level model was developed. In this child-level model, only 6 child-level predictors were tested. No predictors were at the city-level. This explained the variation in each behavioral and emotional outcome among children with the child-level variables. The purpose was to examine the effects of child characteristics on their behavioral and emotional outcomes. Using prosocial behavior outcome as an example, the child-level model was tested as following:

For the level-1 or child-level equation

$$\begin{aligned}(\text{Prosocial Behavior})_{ij} = \beta_{0j} + \beta_{1j}(\text{age})_{ij} + \beta_{2j}(\text{gender})_{ij} \\ + \beta_{3j}(\text{SES of the parents})_{ij} + \beta_{4j}(\text{number of parents})_{ij} \\ + \beta_{5j}(\text{number of siblings})_{ij} + \beta_{6j}(\text{family size})_{ij} + r_{ij}.\end{aligned}$$

where

(Prosocial Behavior)$_{ij}$, is the prosocial behavior outcome of child i in city j (j = 1, . . . , 25 cities);

β_{0j} is the intercept or 'constant', which is the average measure of the outcome for a particular city j adjusted for child characteristics in that city;

β_{1j}, β_{2j}, β_{3j}, β_{4j}, β_{5j}, β_{6j} are slopes;

β_{1j} is the age effect, that is, the change in prosocial outcome scores for one year increase in a child's age;

β_{2j} is the gender effect, which is the difference between boys and girls in prosocial behavioral outcomes;

β_{3j} is the effect of the SES of the parents, which represents the change in prosocial behavior scores for each 1-point increase in the SES of the parents;

β_{4j} is the effect of the number of parents, which is the difference between single parent and both parents in the prosocial outcome;

β_{5j} is the effect of the number of siblings. It represents the change in prosocial behavioral scores for one more sibling;

β_{6j} is the effect of family size, that is, the change in prosocial outcomes with a one person increase in a family size; and

r_{ij} is the 'residual' or error term associated with prosocial behavior scores.

For the level-2 or city-level equation

The parameters, β_{0j}, β_{1j}, β_{2j}, β_{3j}, β_{4j}, β_{5j}, and β_{6j}, vary across cities in the level 2 as a function of a grand mean and a random error:

$$\beta_{0j} = \gamma_{00} + u_{0j},$$

$$\beta_{1j} = \gamma_{10} + u_{1j},$$

$\beta_{2j} = \gamma_{20} + u_{2j},$

$\beta_{3j} = \gamma_{30} + u_{3j},$

$\beta_{4j} = \gamma_{40} + u_{4j},$

$\beta_{5j} = \gamma_{50} + u_{5j},$

$\beta_{6j} = \gamma_{60} + u_{6j}.$

where

γ_{00} is the adjusted national mean prosocial behavior score;

$\gamma_{10}, \gamma_{20}, \gamma_{30}, \gamma_{40}, \gamma_{50},$ and γ_{60} are the average regression slopes across cities;

u_{0j} is the unique increment to the intercept associated with city j; and

$u_{1j}, u_{2j}, u_{3j}, u_{4j}, u_{5j},$ and u_{6j} are the unique increment to the slopes associated with city j.

Stage 3: 11 city-level variables were added to the child-level model to model these city characteristics on a particular behavioral and emotional outcome. This "full" model contained independent variables at both the child and the city levels. It estimated not only effects of child-level variables, but also effects of city-level variables over and above those of child-level variables. Again, using prosocial behavior outcome as an example, the full model was tested as following:

<u>For the level-1 or child-level equation</u>

$$(\text{Prosocial Behavior})_{ij} = \beta_{0j} + \beta_{1j}(\text{age})_{ij} + \beta_{2j}(\text{gender})_{ij} + \beta_{3j}(\text{SES of the parents})_{ij} + \beta_{4j}(\text{number of parents})_{ij} + \beta_{5j}(\text{number of siblings})_{ij} + \beta_{6j}(\text{family size})_{ij} + r_{ij}.$$

<u>For the full model (child-level and city-level model) equation</u>

The variation of β_{0j} and the six slopes across cities were then modeled at the city level with 11 city characteristics.

$\beta_{0j} = \gamma_{00} + \gamma_{01}$(1996 population size)$_j$ + γ_{02}(percentage of the total population between 15 and 64 years of age)$_j$ + γ_{03}(divorce rate)$_j$ + γ_{04}(percentage of immigrants)$_j$ + γ_{05}(unemployment rate)$_j$ + γ_{06}(percentage of labor force working in health)$_j$ + γ_{07}(percentage of labor force working as teachers and professors)$_j$ + γ_{08}(percentage of labor force working as childcare and home support workers)$_j$ + γ_{09} (percentage of population 15 years and over with post-secondary education)$_j$ + γ_{10} (percentage of migrants)$_j$ + γ_{11}(percentage of low economic families income)$_j$ + u_{0j},

$\beta_{1j} = \gamma_{10}$,

$\beta_{2j} = \gamma_{20}$,

$\beta_{3j} = \gamma_{30}$,

$\beta_{4j} = \gamma_{40}$,

$\beta_{5j} = \gamma_{50}$,

$\beta_{6j} = \gamma_{60}$.

where

γ_{00} is the adjusted national mean prosocial behavior score;

γ_{01}, γ_{02}, γ_{03}, γ_{04}, γ_{05}, γ_{06}, γ_{07}, γ_{08}, γ_{09}, γ_{10}, and γ_{11} are the city effects;

γ_{10}, γ_{20}, γ_{30}, γ_{40}, γ_{50}, and γ_{60} are the pooled city-level regression coefficients for the child-level variables; and

u_{0j} is the city-level residual or the unique effect associated with city j.

The full model in this study functioned to model the variation in the outcome measures as it was related to child and city characteristics. The estimates indicated child-level and city-level variables that were responsible for the variation in the outcome measures. Results of this model were used to address the third and the fourth research questions. The level of significance was set at 0.05.

Program

In this study the HLM 5.05 program and the SPSS 11.0 program were used for data analysis.

Centering

Centering of variables allows variables under study to have precise and relevant meanings so that statistical results can be understood in terms of theoretical impact (Raudenbush & Bryk, 2002). In the case of HLM, the intercept and slopes in the level-1 model become outcome variables at level-2. The meaning of the intercept in the level-1 model depends on the location of the level-1 predictor variables. Similarly, interpretation regarding the intercept in the level-2 model depends on the location of level-2 predictors entered into the model. Fortunately, if we only change the "location" of independent variables but do not change the scale in which it is measured, we get a mathematically equivalent model. In such a model, the slopes (β_{ij}) remain the same, but the intercept (β_{0j}) changes to reflect the change in the independent values. Such a transformation is called centering.

HLM provides the user with three options when entering predictors (independent variables) into model:

- adding a predictor uncentered;

- adding a predictor grand mean centered; and
- adding a predictor group mean centered.

In this study, the interest was on the average level of behavioral and emotional outcomes among low SES children in 25 major Canadian cities. Therefore, all the predictors at both level-1 and level-2 were centered around their corresponding grand mean. Grand mean centering yields an intercept that can be interpreted as an adjusted mean for group *j*. In this case, it was referred to as the "typical child" with nationally average characteristics (in terms of gender, age, SES of the parents, number of parents, number of siblings, and family size) among low SES children.

Weighting

In many studies, the data are derived from sample surveys in which units have been selected with known but unequal probabilities. In these cases, it is often desirable to weight observations in order to produce unbiased estimates of population parameters (Raudenbush et al., 2000). It is also recommended in the NLSCY guidelines, that design weights should be used to derive meaningful estimates from the survey. In this study, cross-sectional weights (AWTCW01), provided by the NLSCY were used to supply generalizations that apply to a population of child-level units. To preserve the effective sample size, a normalized weighting procedure was performed by the HLM 5.05 program.

CHAPTER 4

RESULTS

This chapter reports the statistical results. It contains three parts. The first part presents the results of the descriptive statistics for the measures of the independent and dependent variables. The second part displays the results of the hierarchical linear modeling through the null or unconditional model, the child-level model, and the city-level model in the sequence of the prosocial behavior, hyperactivity-inattention, conduct disorder-physical aggression, indirect aggression, emotional disorder-anxiety, and property offences. The third part contains a brief summary of the overall results.

Description of the Sample

Table 1 shows the means and standard deviations of the measures of the independent and dependent variables used at the child level and the city level for the 2,362 low income family children.

Children

The sample included 4,566 children aged 4 to 11 years who lived in 25 major Canadian cities with populations of at least 100,000. Within this group, there were 2,362 children who came from low SES families. These children lived in families whose income was below the 1995 Canadian Low-Income Cut-Offs[4] level. The educational level of these children's parents was no more than grade 13, and their occupations were not classified as professional. Of these children, the average age was 7 years old.

[4] Canadian Low-Income Cut-Offs, 1995 (LICOs) were published by Statistics Canada (1996). Families living below theses levels were considered to be living in "straitened circumstances." The LICOs are more popularly known as Canada's poverty lines. More detailed information about 1995 LICOs is available at the Statistics Canada website (www.statcan.ca).

Table 1

Descriptive Statistics of Six Child-level Variables[5]*, Eleven City-level Variables, and Six Dependent Variables*

Child-level Variables	**Mean**	**SD**	**Min**	**Max**
Age of child	7.43	2.29		
Gender of child (F=1, M=0)	0.51	0.50		
SES	-0.58	0.49		
Child's single parent status (single=1, both=0)	0.27	0.44		
Siblings	1.41	1.01		
Family size	4.33	1.29		
City-level Variables				
Population size	74.91	100.69	12.56	426.38
Percentage of total population aged 15 to 64	74.69	1.99	70.81	78.40
Divorce rate	14.78	3.58	10.24	24.86
Percentage of immigrants	14.94	9.95	0.72	41.58
Unemployment rate	9.54	2.06	6.60	14.20
Percentage of labor force working in health	5.38	0.82	3.60	6.85
Percentage of labor force working as teachers and professors	4.22	0.57	3.25	5.49
Percentage of labor force working as childcare and home support worker	2.51	0.54	1.55	3.27
Percentage of population 15 and over with post-secondary education	13.49	3.49	8.56	20.76
Percentage of migrants	5.68	1.28	3.38	8.79
Percentage of low economic families income	15.70	3.05	10.10	22.60
Outcome Variables				
Prosocial behavior	12.23	3.93	0	20
Hyperactivity-inattention	4.87	3.68	0	16
Conduct disorder-physical aggression	1.44	1.98	0	12
Indirect aggression	1.36	1.88	0	10
Emotional disorder-anxiety	2.83	2.74	0	15
Property offences	0.99	1.41	0	12

Note. For child-level variables N=2362. The descriptive statistics were calculated using normalized weights. For city-level variables N=25. The descriptive statistics were calculated from the raw data. Population size is represented as the number of units, with 10,000 people as one unit.

There were slightly more girls (51.0%) than boys (49.0%). The average SES was -0.58. Employing Statistics Canada codes to describe family SES (see page 6), the average

[5] Statistics Canada has restrictions on releasing the minimum and maximum values of confidential data in an effort to minimize the "risk of disclosure." For this reason, the minimum and maximum values for age of child, gender of child, SES, child's single parent status, siblings and family size were not displayed on Table 1. City-level variables were derived from publicly released data, therefore the restriction was not applicable.

family SES corresponds closely to a family in which the PMK and spouse have both completed grade 12, the PMK is employed in a semi-skilled clerical position and the spouse in a semi-skilled manual position, and household income is approximately $16,000. 73.0% were from two parent families, and 27.0% came from single parent families. On average each child had one sibling. The average family size was 4 persons.

Cities

The descriptive statistics for the city-level variables were derived from 1996 Census data. The average population size was 749,100 with a minimum of 125,600 people and a maximum of 4,263,800 people. On average, 74.7% of the population was aged between 15 to 64 years old. The average divorce rate was 14.8% with a range from 10.2% to 24.9%. On average, 14.9% of the population were immigrants with a range from 0.7% to 41.6%. The average unemployment rate was 9.5% with a range from 6.6% to 14.2%. On average 5.4% of labor force were working in health related fields with a range from 3.6% to 6.9%. There was 4.2% of the labor force working as teachers and professors with a range from 3.3% to 5.5%. On average, 2.5% of the labor force was working as childcare and home support workers with a range from 1.6% to 3.3%. On average, 13.5% of the population aged 15 and over had a post-secondary education with a range from 8.6% to 20.8%. On average, 5.7% of the population who lived in 25 cities were migrants, with a range from 3.4% to 8.8%. Also, on average, 15.7% of families were in the low economic family income category, with a range from 10.1% to 22.6%.

Outcome Variables

The results did not show any serious concerns for behavioral and emotional outcomes among low SES children. The mean for prosocial behavior was 12.23 on a

scale ranging from 0 to 20. The mean for hyperactivity-inattention was 4.87 on a scale ranging from 0 to 16. The mean for conduct disorder-physical aggression was 1.44 on a scale ranging from 0 to 12. The mean for indirect aggression was 1.36 on a scale ranging from 0 to 10. The mean for emotional disorder-anxiety was 2.83 on a scale ranging from 0 to 16. The mean for property offences was 0.99 on a scale ranging from 0 to 12. Recall that for all outcome measures, a high score indicates a greater presence of each behavioral and emotional outcome. Therefore, prosocial behavior was on the positive side among low SES children. Hyperactivity-inattention, conduct disorder-physical aggression, indirect aggression, emotional disorder-anxiety, and property offences, on the other hand, showed low scores among low SES children.

Results of Hierarchical Linear Modeling

As described in Chapter 3, children's behavioral and emotional outcomes were estimated following a three-stage procedure, beginning with the "null" model, followed by the child-level analyses, and then the "full" model that included both child and city level variables. These analyses were completed separately for each of the six dependent variables. Likewise the results of each stage are presented separately for each dependent variable.

Prosocial Behavior

Null Model Results

Table 2 presents the results from the "null" model for prosocial behavior. As shown, the maximum likelihood point estimate of the grand mean for prosocial behavior is 12.23 with a standard error of 0.15, indicating a 95% confidence interval of $12.23 \pm 1.96(0.15) = (11.94, 12.52)$.

Table 2 also includes the maximum likelihood estimates of the variance components. At the child level, $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 15.10$; at the city level, $\hat{\tau}_{00}$ is the variance of the city means, $\hat{\beta}_{0j}$, around the grand mean. The estimated variability of the 25 city means is $\hat{\tau}_{00} = 0.34$. The result of the Chi-square test ($\chi^2 = 73.51$ with 24 degrees of freedom) is significant ($\rho < .05$) under the null hypothesis H_0: $\tau_{00} = 0$. The evidence indicates significant variation among cities in children's prosocial behavior outcomes.

Although variation of prosocial behavior among cities is significantly different from zero, the value indicates that most of the variation is at the child level. The estimated intraclass correlation $\hat{\rho}$, which represents the proportion of variance in prosocial behavior ($\overline{Y}_{.j}$) between cities,

is $\hat{\rho} = \hat{\tau}_{00} / (\hat{\tau}_{00} + \hat{\sigma}^2) = 0.34 / (0.34 + 15.10) = 0.016$. Therefore, about 1.6% of the total variance in prosocial behavior is attributable to between cities differences, and about 98.4% of the variance is attributable to within city variability. This shows that most of the variation is accounted for by child characteristics, although city level variables are also responsible for the variation.

Table 2

Results from Null Model on Prosocial Behavior

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	12.23	0.15	80.64	.000
Random effects	**Variance component**	***df***	χ^2	*p*
City mean, u_{0j}	0.34	24	73.51	.000
Level 1 effect, r_{ij}	15.10			

HLM provides a reliability estimate for the reliability of each sample city mean $\bar{\lambda}_j$ as an estimate of the corresponding population city mean β_{0j}. The reliabilities will vary across cities because city sizes vary. However, an overall measure of the reliability equal to the average of the city reliabilities is commonly used. For the null model on prosocial behavior, the reliability estimate is 0.57, indicating that the sample means tend to be moderately reliable as indicators of the true city means.

Child-level Results

Six independent variables were tested at the child-level: age, gender, SES, number of parents, number of siblings, and family size. There were no variables at the city level in this model. Each of the child-level variables was grand-mean centered so that the intercepts corresponded to the city means after controlling for the six child-level variables.

The results of this analysis are reported in Table 3 for prosocial behavior. Three of the variables - age, gender, and number of parents - were significant predictors ($p <$ .05). The remaining three variables (SES, number of siblings, and family size) were removed from the model because they were not significant predictors ($p \geq .05$). The analysis was then repeated with the three retained child-level variables used as the predictors. The final random coefficient model results are shown in Table 3.

The average of the adjusted city means, $\hat{\gamma}_{00}$, is 12.20 with a standard error of 0.15. The average age-prosocial slope is 0.24 with a standard error of 0.03 and a t ratio of 7.30 ($p < .05$). This indicates that, on average, child's age is significantly and positively related to prosocial behavior outcome within cities. This finding suggests that when all other variables in the model are held constant, with a one year increase in a child's age,

we can expect a 0.24 point increase in the prosocial outcome score. The average gender-prosocial slope is 1.61 with a standard error of 0.16 and a *t* ratio of 10.03 ($p < .05$). The positive sign indicates girls (F = 1, M = 0) were scoring 1.61 points higher than boys for the prosocial outcome after holding the other variables constant. Similarly, the average number of parents-prosocial slope is -0.36 with a standard error of 0.13 and a *t* ratio of -2.73 ($p < .05$). This indicates that, on average, number of parents is significantly and negatively related to the prosocial outcome scores within cities. This means that when all other variables in the model are held constant, children who came from single parent families (single = 1, both = 0) had a 0.36 point lower prosocial score than children who were from two parent families.

Table 3

Results from the Child-level Model on Prosocial Behavior

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	12.20	0.15	82.22	.000
Age-prosocial slope, γ_{10}	0.24	0.03	7.30	.000
Gender-prosocial slope, γ_{20}	1.61	0.16	10.03	.000
Nparents[a]-prosocial slope, γ_{30}	-0.36	0.13	-2.73	.012
Random effects	**Variance component**	***df***	**χ^2**	***p***
City mean, u_{0j}	0.34	24	79.76	.000
Age-prosocial slope, u_{1j}	0.01	24	24.14	.454
Gender-prosocial slope, u_{2j}	0.09	24	22.64	>.500
Nparents-prosocial slope, u_{3j}	0.09	24	14.41	>.500
Level 1 effect, r_{ij}	14.02			

Note. [a]Nparents represents "number of parents."

Table 3 also provides estimates of the variances of the random effects and tests of the hypothesis that these variances are null. The estimated variance among the city means is $\hat{\tau}_{00} = 0.34$, with a Chi-square test $\chi^2_{24} = 79.76, p < .05$, suggesting that significant

differences exist among the 25 city means, a result quite similar to that found for the "null model".

The estimated variance of the slopes are $\hat{\tau}_{1j} = 0.01$ with a $\chi^2_{24} = 24.14, p \geq .05$; $\hat{\tau}_{2j} = 0.09$ with $\chi^2_{24} = 22.64, p \geq .05$; and $\hat{\tau}_{3j} = 0.09$ with $\chi^2_{24} = 14.41, p \geq .05$. We retain the null hypotheses, in these cases $\tau_{1j} = 0$, $\tau_{2j} = 0$, and $\tau_{3j} = 0$, and infer that the relationship between age and prosocial behavior, between gender and prosocial behavior, between number of parents and prosocial behavior do not vary significantly across cities.

Child-level and City-level (Full Model) Results

Based on the child-level results presented and discussed above, the only significant variation was among city means adjusted for child age, gender, and number of parents. Consequently, the intercept was specified as random and child's age, gender, and number of parents were specified as fixed in the full model.

The city means were modeled as a function of the 11 city-level variables (see Table 1). Of these 11 variables, two were significant ($p < .05$): percentage of immigrants and percentage of low economic families income. The remaining nine city-level variables were removed. The full model analysis was repeated with three child-level variables and two city-level variables. The results for the full model are reported in Table 4 for the three independent variables retained at the child-level analysis and the two independent variables retained at the city-level.

The results at the child level are similar to the results reported in Table 3. The slight differences are attributable to the simultaneous estimation at the child and city levels in the full model. Again, all three child-level variables: child's age, gender, and number of parents are significant ($p < .05$).

Table 4

Results from the Random Intercept Model on Prosocial Behavior

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city means				
Intercept, γ_{00}	12.17	0.14	83.96	.000
Variables at the child level				
Age, γ_{10}	0.26	0.04	6.83	.000
Gender, γ_{20}	1.59	0.18	8.63	.000
Nparents[b], γ_{30}	-0.37	0.14	-2.67	.008
Variables at the city level				
Immigran[c], γ_{01}	0.03	0.01	2.14	.043
Lowincom[d], γ_{02}	-0.08	0.03	-2.38	.027
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.23	22	47.38	.002
Level 1 effect, r_{ij}	14.08			
Proportion of variance explained	Between children		Between cities	
Note. [b]Nparents represents "number of	6.8%		32.4%	

Note. [b]Nparents represents "number of parents." [c]Immigran represents "percentage of immigrants." [d]Lowincom represents "percentage of low economic families income."

At the city level, the percentage of the immigrants is positively related to city mean prosocial behavior outcome. The value of the coefficient, $\hat{\gamma}_{01}$, is 0.03 with a standard error of 0.01 and a *t* ratio of 2.14 ($p < .05$). This indicates that the percentage of the immigrants is significantly and positively related to the mean prosocial behavior. Given all other variables in the model are held constant, with a one percent increase in the percentage of immigrants, we can expect 0.03 point increase in a city's prosocial outcome score. Also, the percentage of low economic family income is negatively related to city mean prosocial behavioral outcome. In this case the value of the coefficient, $\hat{\gamma}_{02}$, is -0.08 with a standard error of 0.03 and a *t* ratio of -2.38 ($p < .05$). This indicates that the percentage of low economic family income is significantly negatively related to the

intercept across cities. Given all other variables in the model are held constant, we can expect 0.08 point decrease in a city's prosocial outcome score, with a one percent increase in percentage of low economic family income.

Table 4 also indicates the proportion of variance accounted for at the child and city levels. About 6.8% of the variance in the prosocial behavior outcome measure was explained at the child level. Hence, child's age, gender, and number of parents accounted for about 6.8% of the child-level variance in prosocial behavior. At the city level, the estimated residual variance (city-level variance) is now 0.23, whereas the "null model" variance of intercepts it was 0.34. This means that percentage of the immigrants and percentage of low economic family income accounted for 32.4% of the city-level variance in prosocial behavior outcome. The test of the null hypothesis that no residual variance remains to be explained is rejected ($\chi^2_{22} = 47.38, p < .05$). Taken together, the child and city level results suggest the need for additional variables at both levels to more fully explain the variation in prosocial behavior. For the full model on prosocial behavior, the reliability estimate is 0.51, indicating that the sample means tend to be moderately reliable as indicators of the true city means. This finding is comparable to the reliability estimate for the null model. Together, the two results again call for additional research.

Hyperactivity-Inattention

Null Model Results

Table 5 shows the results from the "null" model for hyperactivity-inattention. The maximum likelihood point estimate for the grand mean for hyperactivity-inattention

is 4.89 with a standard error of 0.13, indicating a 95% confidence interval of 4.89 ± 1.96(0.13) = (4.64, 5.14).

Table 5

Results from Null Model on Hyperactivity-Inattention

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	4.89	0.13	38.02	.000
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.21	24	73.41	.000
Level 1 effect, r_{ij}	13.24			

Table 5 also includes the maximum likelihood estimates of the variance components. At the child level $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 13.24$; at the city level, the variance is $\hat{\tau}_{00} = 0.21$. The result of the Chi-square test ($\chi^2 = 73.41$ with 24 degrees of freedom), is significant ($\rho < .05$) under the null hypothesis H_0: $\tau_{00} = 0$. The evidence indicates significant variation among cities in children's hyperactivity-inattention outcomes.

Although variation of hyperactivity-inattention among cities is significantly different from zero, the value indicates that most of the variation is at the child level. The proportion of variance in hyperactivity-inattention ($\overline{Y}_{.j}$) between cities, is $\hat{\rho} = \hat{\tau}_{00} / (\hat{\tau}_{00} + \hat{\sigma}^2) = 0.21/(0.21 + 13.24) = 0.02$. Therefore, about 2% of the variance in hyperactivity-inattention is between cities differences, and about 98% of the variance is within city variability. This shows that most of the variation is accounted for by child characteristics, which was also the case for prosocial behavior.

For the null model on hyperactivity-inattention, the reliability estimate is 0.50, indicating that the sample means tend to be moderately reliable as indicators of the true city means.

Child-level Results

Five of the six child-level variables - age, gender, SES, number of parents, and number of siblings - were significant predictors of hyperactivity-inattention ($p < .05$). The remaining variable (family size) was removed from the model ($p \geq .05$). The analysis was then repeated with the five retained child-level variables used as predictors. The final random coefficient model results are shown in Table 6.

Table 6

Results from the Child-level Model on Hyperactivity-Inattention

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	4.89	0.12	40.75	.000
Age-hyperactivity[e] slope, γ_{10}	-0.09	0.04	-2.46	.022
Gender-hyperactivity slope, γ_{20}	-1.35	0.17	-7.85	.000
SES-hyperactivity slope, γ_{30}	-0.50	0.20	-2.52	.019
Nparents[f]-hyperactivity slope, γ_{40}	1.02	0.18	5.78	.000
Siblings[g]-hyperactivity slope, γ_{50}	-0.24	0.07	-3.41	.003
Random effects	**Variance component**	***df***	χ^2	***p***
City mean, u_{0j}	0.18	24	72.06	.000
Age-hyperactivity slope, u_{1j}	0.01	24	30.89	.157
Gender-hyperactivity slope, u_{2j}	0.56	24	28.03	.258
SES-hyperactivity slope, u_{3j}	0.26	24	40.58	.018
Nparents-hyperactivity slope, u_{4j}	0.14	24	31.90	.129
Siblings-hyperactivity slope, u_{5j}	0.03	24	27.76	.270
Level 1 effect, r_{ij}	12.31			

Note. [e]Hyperactivity represents "hyperactivity-inattention." [f]Nparents represents "number of parents." [g]Siblings represents "number of siblings."

The average of the city means, $\hat{\gamma}_{00}$, is 4.89 with a standard error of 0.12. The average age-hyperactivity slope is -0.09 with a standard error of 0.04 and a *t* ratio of -2.46 ($p < .05$). This indicates that, on average, child's age is significantly and negatively related to hyperactivity-inattention within cities. This finding suggests that when all other variables in the model are held constant, we can expect a 0.09 point decrease in the

hyperactivity-inattention score with a one year increase in a child's age. The average gender-hyperactivity slope is -1.35 with a standard error of 0.17 and a t ratio of -7.85 ($p <$ .05). The negative sign indicates girls were scoring 1.35 points lower than boys for the hyperactivity-inattention after holding the other variables constant. The average SES-hyperactivity slope is -0.50 with a standard error of 0.20 and a t ratio of -2.52 ($p < .05$). The negative sign indicates that an increase of one point in the child's SES is associated with a 0.50 point decrease for the hyperactivity-inattention outcome after holding the other variables constant. The average number of parents-hyperactivity slope is 1.02 with a standard error of 0.18 and a t ratio of 5.78 ($p < .05$). This indicates that, on average, number of parents is significantly and positively related to the hyperactivity-inattention scores within cities. Given all other variables in the model are held constant, children who came from single parent families had a 1.02 point higher hyperactivity-inattention score than children who were from two parent families. In contract, the average number of siblings-hyperactivity slope is -0.24 with a standard error of 0.07 and a t ratio of -3.41 ($p < .05$). This indicates that, on average, number of siblings is significantly and negatively related to the hyperactivity-inattention scores within cities. This means that when all other variables in the model are held constant, we can expect a 0.24 point decrease in hyperactivity-inattention score with a one sibling increase.

Table 6 also provides estimates of the variances of the random effects and tests of the hypothesis that these variances are null. The estimated variance among the city means is $\hat{\tau}_{00} = 0.18$, with a Chi-square test $\chi^2_{24} = 72.06$, $p < .05$, suggesting that significant differences exist among the 25 city means, a result quite similar to that found for the "null model".

The estimated variance of the slopes are $\hat{\tau}_{1j} = 0.01$ with a $\chi^2_{24} = 30.89, p \geq .05$; $\hat{\tau}_{2j} = 0.56$ with $\chi^2_{24} = 28.03, p \geq .05$; $\hat{\tau}_{3j} = 0.26$ with $\chi^2_{24} = 40.58, p \leq .05$; $\hat{\tau}_{4j} = 0.14$ with $\chi^2_{24} = 31.90, p \geq .05$; and $\hat{\tau}_{5j} = 0.03$ with $\chi^2_{24} = 27.76, p \geq .05$. We retain the null hypotheses, in these cases $\tau_{1j} = 0$, $\tau_{2j} = 0$, $\tau_{4j} = 0$, and $\tau_{5j} = 0$, and infer that the relationship between age and hyperactivity-inattention, between gender and hyperactivity-inattention, between number of parents and hyperactivity-inattention, between number of siblings and hyperactivity-inattention do not vary significantly across the population of cities. However, we reject the null hypothesis, in this case $\tau_{3j} = 0$, and infer that the relationship between SES and hyperactivity-inattention does vary significantly across cities.

Child-level and City-level (Full Model) Results

Based on the child-level results presented and discussed above, the city means adjusted for child age, gender, SES, number of parents, and number of siblings varied significantly. In addition, the SES-hyperactivity slope also varied significantly at the city level. However, as indicated in Chapter 1 and Chapter 3, the research focus in this study was on the intercepts and not on the slopes. Consequently, the intercept was specified as random and child's age, gender, SES, number of parents, and number of siblings were specified as fixed in the full model.

The city means were modeled as a function of the 11 city-level variables (see Table 1). Of these 11 variables, two were significant ($p < .05$): percentage of immigrants and percentage of labor force working in health. The remaining nine city-level variables were removed. The five significant child variables at the child level were reduced to three: gender, number of parents, and number of siblings. The full model analysis was

repeated with three child-level variables and two city-level variables. The results for the full model are reported in Table 7 for the three independent variables retained at the child-level and the two independent variables retained at the city-level.

The results at the child level are similar to the results reported in Table 6 for the variables retained. The slight differences are attributable to the simultaneous estimation at the child and city level in the full model. Again, gender, number of parents, and number of siblings are significant at the child level ($p < .05$).

Table 7

Results from the Random Intercept Model on Hyperactivity-Inattention

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city means				
Intercept, γ_{00}	4.89	0.12	40.46	.000
Variables at the child level				
Gender, γ_{10}	-1.18	0.20	-5.95	.000
Nparents[h], γ_{20}	1.11	0.21	5.39	.000
Siblings[i], γ_{30}	-0.27	0.08	-3.52	.001
Variables at the city level				
Immigran[j], γ_{01}	-0.03	0.01	-2.87	.009
Health[k], γ_{02}	-0.36	0.15	-2.44	.023
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.15	22	52.00	.000
Level 1 effect, r_{ij}	12.58			
Proportion of variance explained	Between children		Between cities	
	5.0%		29.4%	

Note. [h]Nparents represents "number of parents." [i]Siblings represents "number of siblings." [j]Immigran represents "percentage of immigrants." [k]Health represents "percentage of labor force working in health."

At the city level, the percentage of the immigrants is negatively related to city mean hyperactivity-inattention outcome. The value of the coefficient, $\hat{\gamma}_{01}$, is -0.03 with a standard error of 0.01 and a *t* ratio of -2.87 ($p < .05$). This indicates that the percentage of

immigrants is significantly and negatively related to the mean hyperactivity-inattention. Given all other variables in the model are held constant, with a one percent increase in the percentage of immigrants, we can expect 0.03 point decrease in a city's hyperactivity-inattention score. Also, the percentage of labor force working in health field is significantly and negatively related to city mean hyperactivity-inattention. In this case the value of the coefficient, $\hat{\gamma}_{02}$, is -0.36 with a standard error of 0.15 and a t ratio of -2.44 ($p < .05$). Given all other variables in the model are held constant, we can expect 0.36 point decrease in a city's hyperactivity-inattention score with a one percent increase in percentage of labor force working in health,.

Table 7 also indicates the proportion of variance accounted for at the child and city levels. Gender, number of parents, and number of siblings accounted for about 5.0% of the child-level variance in hyperactivity-inattention. At the city level, the percentage of immigrants and percentage of labor force working in health accounted for 29.4% of the city-level variance in hyperactivity-inattention outcome. The test of the null hypothesis that no residual variance remained to be explained is rejected ($\chi^2_{22} = 52.00$, $p < .05$). Thus, taken together the child level and the city level results suggest the need for additional variables at both levels to more fully explain the variation in hyperactivity-inattention. For the full model on hyperactivity-inattention, the reliability estimate is 0.43, indicating that the sample means tend to be less moderately reliable as indicators of the true city means than was the case for prosocial behavior. This finding is comparable to the same finding for the null model. Together, the two sets of results call for additional research.

Conduct Disorder-Physical Aggression

Null Model Results

Table 8 presents the results from the "null" model for conduct disorder-physical aggression. The maximum likelihood point estimate for the grand mean for conduct disorder-physical aggression is 1.51 with a standard error of 0.06, indicating a 95% confidence interval of $1.51 \pm 1.96(0.06) = (1.39, 1.63)$.

Table 8

Results from Null Model on Conduct Disorder-Physical Aggression

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	1.51	0.06	24.30	.000
Random effects	**Variance component**	***df***	χ^2	*p*
City mean, u_{0j}	0.04	24	49.54	.002
Level 1 effect, r_{ij}	3.90			

Table 8 also includes the maximum likelihood estimates of the variance components. At the child level, $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 3.90$; at the city level, $\hat{\tau}_{00}$ is 0.04. The null hypothesis H_0: $\tau_{00} = 0$ is rejected ($\chi^2 = 49.54$; $df = 24$; $\rho < .05$). The evidence indicates significant variation among cities in children's conduct disorder-physical aggression outcomes. Although the variation of conduct disorder-physical aggression among cities is significantly different from zero, most of the variation is at the child level. About 1% of the variance in conduct disorder-physical aggression is between cities differences, and about 99% of the variance is within city variability.

For the null model on conduct disorder-physical aggression, the reliability estimate is 0.40, indicating that the sample means tend to be somewhat moderately reliable as indicators of the true city means.

Child-level Results

Four of the child-level variables - age, gender, number of parents, and number of siblings - were significant predictors of conduct disorder-physical aggression ($p < .05$). The remaining two variables (SES and family size) were removed from the model ($p \geq .05$). The results of the analysis with the four retained child-level variables are shown in Table 9.

Table 9

Results from the Child-level Model on Conduct Disorder-Physical Aggression

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	1.51	0.06	25.72	.000
Age-conduct[l] slope, γ_{10}	-0.05	0.02	-2.20	.038
Gender-conduct slope, γ_{20}	-0.73	0.10	-7.70	.000
Nparents[m]-conduct slope, γ_{30}	0.75	0.08	8.84	.000
Siblings[n]-conduct slope, γ_{40}	0.16	0.04	3.66	.001
Random effects	**Variance component**	***df***	χ^2	***p***
City mean, u_{0j}	0.04	24	55.44	.000
Age-conduct slope, u_{1j}	0.01	24	39.21	.026
Gender-conduct slope, u_{2j}	0.06	24	33.29	.098
Nparents-conduct slope, u_{3j}	0.03	24	25.99	.353
Siblings-conduct slope, u_{4j}	0.01	24	31.96	.128
Level 1 effect, r_{ij}	3.62			

Note. [l]Conduct represents "conduct disorder-physical aggression." [m]Nparents represents "number of parents." [n]Siblings represents "number of siblings."

The average of the city means, $\hat{\gamma}_{00}$, is 1.51 with a standard error of 0.06. The average age-conduct slope is -0.05 with a standard error of 0.02 and a *t* ratio of -2.20 ($p < .05$). This indicates that, on average, child's age is significantly and negatively related to conduct disorder-physical aggression within cities. This finding suggests that when all other variables in the model are held constant, we can expect a 0.05 point decrease in the conduct disorder-physical aggression score, with a one year increase in a child's age. The

average gender-conduct slope is -0.73 with a standard error of 0.10 and a t ratio of -7.70 ($p < .05$). The negative sign indicates girls were scoring 0.73 points lower than boys for the conduct disorder-physical aggression outcome after holding the other variables constant. The average number of parents-conduct slope is 0.75 with a standard error of 0.08 and a t ratio of 8.84 ($p < .05$). Given all other variables in the model are held constant, children who came from single parent families had a 0.75 point higher score than children who were from two parent families in conduct disorder-physical aggression score. Similarly, the average number of siblings-conduct slope is 0.16 with a standard error of 0.05 and a t ratio of 3.66 ($p < .05$). This indicates that when all other variables in the model are held constant, we can expect a 0.16 point increase in conduct disorder-physical aggression score, with a one sibling increase.

Table 9 also provides estimates of the variances of the random effects and tests of the hypothesis that these variances are null. The estimated variance among the means is $\hat{\tau}_{00} = 0.04$, with a Chi-square test $\chi^2_{24} = 55.44, p < .05$, suggesting that significant differences exist among the 25 city means, a result quite similar to that found for the "null model".

The estimated variance of the slopes are $\hat{\tau}_{1j} = 0.01$ with a $\chi^2_{24} = 39.21, p < .05$; $\hat{\tau}_{2j} = 0.06$ with $\chi^2_{24} = 33.29, p \geq .05$; $\hat{\tau}_{3j} = 0.03$ with $\chi^2_{24} = 25.99, p \leq .05$; and $\hat{\tau}_{4j} = 0.01$ with $\chi^2_{24} = 31.96, p \geq .05$. We retain the null hypotheses in the 3 latter cases and infer that the relationship between gender and conduct disorder-physical aggression, between number of parents and conduct disorder-physical aggression, and between number of siblings and conduct disorder-physical aggression do not vary significantly across cities. However, the null hypothesis for the age-conduct disorder-physical aggression slope is

rejected, and infer that the relationship between age and conduct disorder-physical aggression does vary significantly across the population of cities.

Child-level and City-level (Full Model) Results

Based on the child-level results presented and discussed above, the significant variation was among city means adjusted for child age, gender, number of parents, and number of siblings. In addition, the age-conduct slope also varied significantly at the city level. However, as pointed out earlier on Chapter 1 and Chapter 3, the focus of the current study was on intercepts not slopes. Therefore, the intercept was specified as random and child's age, gender, number of parents, and number of siblings were specified as fixed in the full model.

Of the 11 city variables, only percentage of the total population between 15 and 64 years of age was significant ($p < .05$). The remaining 10 city-level variables were removed. The four significant child-level variables were reduced to three: gender, number of parents, and number of siblings. The full model analysis was repeated with three child-level variables and one city-level variables. The results for the full model are reported in Table 10 for the three independent variables retained at the child-level analysis and the one independent variable retained at the city-level.

The results at the child level are similar to the results reported in Table 9. The three child-level variables retained: gender, number of parents, and number of siblings were significant ($p < .05$).

At the city level, the percentage of the total population between 15 and 64 years of age is significantly and negatively related to city mean conduct disorder-physical aggression outcome. The value of the coefficient, $\hat{\gamma}_{01}$, is -0.10 with a standard error of

0.03 and a t ratio of -4.05 ($p < .05$). This indicates that with a one percent increase in the percentage of the total population between 15 and 64 years of age, we can expect 0.10 point decrease in a city's conduct disorder-physical aggression score.

Table 10

Results from the Random Intercept Model on Conduct Disorder-Physical Aggression

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean Intercept, γ_{00}	1.49	0.05	30.66	.000
Variables at the child level				
Gender, γ_{10}	-0.67	0.09	-7.30	.000
Nparents[o], γ_{20}	0.77	0.09	8.15	.000
Siblings[p], γ_{30}	0.15	0.04	4.04	.000
Variables at the city level				
Pro15[q], γ_{01}	-0.10	0.03	-4.05	.001
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.02	23	31.45	.112
Level 1 effect, r_{ij}	3.68			
Proportion of variance explained	Between children		Between cities	
	5.9%		50.0%	

Note. [o]Nparents represents "number of parents." [p]Siblings represents "number of siblings." [q]Pro15 represents "percentage of the total population between 15 and 64 years of age."

About 5.9% of the variance in the conduct disorder-physical aggression outcome measure was explained at the child level. Hence, gender, number of parents, and number of siblings accounted for about 5.9% of the child-level variance in the outcome. The percentage of the total population between 15 and 64 years of age accounted for 50.0% of the city-level variance in conduct disorder-physical aggression outcome. The test of the null hypothesis that no residual variance remains to be explained is retained ($\chi^2_{23} = 31.45, p \geq .05$). Thus, the results discourage a search for further city-level variables that might help account for the remaining variation in the intercepts. For the

full model on conduct disorder-physical aggression, the reliability estimate is 0.24, indicating that the sample means tend to be less reliable as indicators of the true city means. The finding is comparable to the same finding for the null model. This result calls for additional research.

Indirect Aggression

Null Model Results

Table 11 presents the results from the "null" model for indirect aggression. The maximum likelihood point estimate of the grand mean for indirect aggression is 1.36 with a standard error of 0.05, indicating a 95% confidence interval of $1.36 \pm 1.96(0.05) =$ (1.26, 1.46).

Table 11

Results from Null Model on Indirect Aggression

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	1.36	0.05	25.81	.000
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.02	24	38.70	.029
Level 1 effect, r_{ij}	3.51			

Table 11 also includes the maximum likelihood estimates of the variance components. At the child level, $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 3.51$; at the city level, the estimated variability of the 25 city means is $\hat{\tau}_{00} = 0.02$. The null hypothesis H_0: $\tau_{00} = 0$ is rejected ($\chi^2 = 38.70$; df=24; $\rho < .05$). The evidence indicates significant variation among cities in children's indirect aggression outcomes. Although the variation of indirect aggression among cities is significantly different from zero, the value again indicates that most of the variation is at the child level. Only 1% of the variance in indirect aggression is between

cities differences. This shows that most of the variation is accounted for by child characteristics.

For the null model on indirect aggression, the reliability estimate is 0.31, indicating that the sample means tend to be less reliable as indicators of the true city means.

Child-level Results

Three of the child variables - age, gender, and number of parents - were significant predictors of indirect aggression ($p < .05$). The remaining three variables (SES, number of siblings, and family size) were removed from the model ($p \geq .05$). The final random coefficient model results are shown in Table 12.

Table 12

Results from the Child-level Model on Indirect Aggression

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	1.34	0.05	28.98	.000
Age-indirect[r] slope, γ_{10}	0.12	0.01	10.08	.000
Gender-indirect slope, γ_{20}	0.17	0.07	2.51	.002
Nparents[s]-indirect slope, γ_{30}	0.66	0.13	4.87	.000
Random effects	**Variance component**	***df***	**χ^2**	***p***
City mean, u_{0j}	0.02	24	31.86	.130
Age-indirect slope, u_{1j}	0.00	24	14.70	>.500
Gender-indirect slope, u_{2j}	0.01	24	17.97	>.500
Nparents-indirect slope, u_{3j}	0.22	24	52.70	.001
Level 1 effect, r_{ij}	3.28			
Proportion of variance explained	**Between children**		**Between cities**	
	6.6%		NA[t]	

Note. [r]Indirect represents "indirect aggression." [s]Nparents represents 'number of parents." [t]NA means not applicable.

The average of the city means, $\hat{\gamma}_{00}$, is 1.34 with a standard error of 0.05. The average age-indirect aggression slope is 0.12 with a standard error of 0.01 and a *t* ratio of

10.08 ($p < .05$). This indicates that, on average, child's age is significantly and positively related to indirect aggression outcome within cities. This finding suggests that when all other variables in the model are held constant, with a one year increase in a child's age, we can expect a 0.12 point increase in the indirect aggression score. The average gender-indirect aggression slope is 0.17 with a standard error of 0.07 and a t ratio of 2.51 ($p < .05$). The positive sign indicates girls scored 0.17 points higher than boys for the indirect aggression outcome after holding the other variables constant. Similarly, the average number of parents-indirect aggression slope is 0.66 with a standard error of 0.13 and a t ratio of 4.87 ($p < .05$). This indicates that, on average, number of parents is significantly and positively related to the indirect aggression scores within cities. Given all other variables in the model are held constant, children who came from single parent families had a 0.66 point higher score than children who were from two parent families in indirect aggression score.

The estimated variance among the means is $\hat{\tau}_{00} = 0.02$, with a Chi-square test $\chi^2_{24} = 31.86$, $p \geq .05$, suggesting that the null hypothesis is tenable. Thus, no significant differences exist among the 25 city means, a result quite different from that found for the "null model". This indicates that child characteristics, rather than city characteristics were responsible for variation among low SES children in indirect aggression. About 6.6% of the variance in the indirect aggression outcome measure was explained at the child level. Hence, age, gender, and number of parents accounted for about 6.6% of the child-level variance in the outcome.

One of the four slopes is significantly different from zero. The relationship between number of parents and indirect aggression within cities does vary significantly

across cities. However, as pointed out earlier, the interest in the present study was on the mean level of each behavior outcome. Consequently, since the intercept does not vary significantly at the city level, the effects of the city-level variables were not estimated for indirect aggression.

For the child-level model on indirect aggression, the reliability estimate is 0.27, indicating that the sample means tend to be poor indicators of the true city means. This finding is comparable to the same finding for the null model.

Emotional Disorder-Anxiety

Null Model Results

Table 13 presents the results from the "null" model for emotional disorder-anxiety. The maximum likelihood point estimate of the grand mean for emotional disorder-anxiety is 2.79 with a standard error of 0.08, indicating a 95% confidence interval of $2.79 \pm 1.96(0.08) = (2.63, 2.95)$.

Table 13

Results from Null Model on Emotional Disorder-Anxiety

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	2.79	0.08	37.00	.000
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.04	24	36.77	.046
Level 1 effect, r_{ij}	7.43			

Table 13 also includes the maximum likelihood estimates of the variance components. At the child level, $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 7.43$; at the city level, the estimated variability of the 25 city means is $\hat{\tau}_{00} = 0.04$. The null hypothesis H_0: $\tau_{00} = 0$ is rejected ($\chi^2 = 36.77$; df = 24; $\rho < .05$). The evidence indicates significant variation among cities in children's emotional disorder-anxiety outcomes. Although the variation of emotional

disorder-anxiety among cities is significantly different from zero, most of the variation is at the child level. About 1% of the variance in emotional disorder-anxiety is between cities differences, and about 99% of the variance is within city variability. This shows that most of the variation is accounted for by child characteristics.

For the null model on emotional disorder-anxiety, the reliability estimate is 0.30, indicating that the sample means tend to be less reliable as indicators of the true city means.

Child-level Results

Three of the child variables - age, gender, and number of parents - were significant predictors of emotional disorder-anxiety ($p < .05$). The remaining three variables (SES, number of siblings, and family size) were removed from the model ($p \geq .05$). The final random coefficient model results are shown in Table 14.

The average of the city means, $\hat{\gamma}_{00}$, is 2.77 with a standard error of 0.07. The average age-emotional disorder-anxiety slope is 0.16 with a standard error of 0.02 and a t ratio of 9.25 ($p < .05$). This indicates that, on average, child's age is significantly and positively related to emotional disorder-anxiety outcome within cities. This finding suggests that when all other variables in the model are held constant, we can expect a 0.16 point increase in the emotional disorder-anxiety score with a one year increase in a child's age. The average SES-emotional disorder-anxiety slope is -0.47 with a standard error of 0.09 and a t ratio of -5.10 ($p < .05$). The negative sign indicates an increase of one point in a child's SES is associated with a 0.47 point decrease in emotional disorder-anxiety after holding the other variables constant. The average number of parents-emotional disorder-anxiety slope is 0.88 with a standard error of 0.12 and a t ratio of 7.35

($p < .05$). This indicates that, on average, number of parents is significantly and positively related to the emotional disorder-anxiety outcome scores within cities. Children who came from single parent families had a 0.88 point higher score than children who were from two parent families in emotional disorder-anxiety score holding all other variables in the model constant.

Table 14

Results from the Child-level Model on Emotional Disorder-Anxiety

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	2.77	0.07	37.34	.000
Age-emotional[u] slope, γ_{10}	0.16	0.02	9.25	.000
SES-emotional slope, γ_{20}	-0.47	0.09	-5.10	.000
Nparents[v]-emotional slope, γ_{30}	0.88	0.12	7.35	.000
Random effects	**Variance component**	***df***	**χ^2**	***p***
City mean, u_{0j}	0.05	24	34.60	.074
Age-emotional slope, u_{1j}	0.00	24	16.94	>.500
SES-emotional slope, u_{2j}	0.02	24	24.34	.442
Nparents-emotional slope, u_{3j}	0.05	24	21.85	>.500
Level 1 effect, r_{ij}	7.02			
Proportion of variance explained	**Between children**		**Between cities**	
	5.5%		NA[w]	

Note. [u]Emotional represents "emotional disorder-anxiety." [v]Nparents represents "number of parents." [w]NA means not applicable.

The estimated variance among the means is $\hat{\tau}_{00} = 0.05$, with a Chi-square test χ^2_{24} = 34.60, $p \geq .05$, suggesting that the null hypothesis is tenable. Thus, no significant differences exist among the 25 city means, a result quite different from that found for the "null model". This indicates that child characteristics, rather than city characteristics were responsible for variation among low SES children in emotional disorder-anxiety. About 5.5% of the variance in emotional disorder-anxiety outcome measure was explained at

the child level. Hence, age, SES, and number of parents accounted for about 5.5% of the child-level variance in the outcome.

The estimated variance of the slopes are $\hat{\tau}_{1j} = 0.00$ with a $\chi^2_{24} = 16.94, p \geq .05$; $\hat{\tau}_{2j} = 0.02$ with $\chi^2_{24} = 24.34, p \geq .05$; and $\hat{\tau}_{3j} = 0.05$ with $\chi^2_{24} = 21.85, p \geq .05$. We retain the null hypotheses, in these cases $\tau_{1j} = 0$, $\tau_{2j} = 0$, and $\tau_{3j} = 0$, and infer that the relationship between age and emotional disorder-anxiety, between SES and emotional disorder-anxiety, and between number of parents and emotional disorder-anxiety do not vary significantly across the population of cities. Therefore, the effects of the city-level variables were not estimated for emotional disorder-anxiety.

For the child-level model on emotional disorder-anxiety, the reliability estimate is 0.29, indicating that the sample means tend to be poor indicators of the true city means. This finding is comparable to the same finding for the null model.

Property Offences

Null Model Results

Table 15 presents the results from the "null" model for property offences. The maximum likelihood point estimate of the grand mean for property offences is 1.00 with a standard error of 0.03, indicating a 95% confidence interval of $1.00 \pm 1.96(0.03) =$ (0.94, 1.06).

Table 15

Results from Null Model on Property Offences

Fixed effect	Coefficient	*se*	*t*-ratio	*p*
Average city mean, γ_{00}	1.00	0.03	37.23	.000
Random effects	Variance component	*df*	χ^2	*p*
City mean, u_{0j}	0.00	24	25.92	.357
Level 1 effect, r_{ij}	1.98			

Table 15 also includes the maximum likelihood estimates of the variance components. At the child level, $\hat{Var}(r_{ij}) = \hat{\sigma}^2 = 1.98$; at the city level, the estimated variability of the 25 city means is $\hat{\tau}_{00} = 0.00$. The result of the Chi-square test $\chi^2 = 25.92$ with 24 degrees of freedom is not significant ($\rho \geq .05$) under the null hypothesis H_0: $\tau_{00} = 0$. The evidence indicates no significant variation among cities in children's property offences outcomes.

The proportion of variance in property offences ($\overline{Y}_{.j}$) between cities, is $\hat{\rho} = \hat{\tau}_{00} / (\hat{\tau}_{00} + \hat{\sigma}^2) = 0.00 / (0.00 + 1.98) = 0.00$. Therefore, 0% of the variance in property offences is between cities differences, and 100% of the variance is within city variability. This shows that all of the variation is accounted for by child characteristics.

For the null model on property offences, the reliability estimate is 0.02, indicating that the sample means tend to be poor indicators of the true city means.

Child-level Results

Four of the child variables: age, gender, SES, and number of parents were significant predictors of property offences ($p < .05$). The remaining two variables: number of siblings, and family size were removed from the model ($p \geq .05$). The final random coefficient model results are shown in Table 16.

The average of the city means, $\hat{\gamma}_{00}$, is 1.02 with a standard error of 0.03. The average age-property offences slope is -0.04 with a standard error of 0.01 and a t ratio of -3.10 ($p < .05$). This finding suggests that when all other variables in the model are held constant, with a one year increase in a child's age, we can expect a 0.04 point decrease in the property offences score. The average gender-property offences slope is -0.43 with a standard error of 0.07 and a t ratio of -6.64 ($p < .05$). The negative sign indicates girls

were scored 0.43 points lower than boys for the property offences after holding the other variables constant. The average SES-property offences slope is -0.38 with a standard error of 0.11 and a *t* ratio of -3.56 ($p < .05$). The negative sign indicates that an increase of one point in the child's SES is associated with a 0.38 point decrease in property offences. Similarly, the average number of parents-property offences slope is 0.36 with a standard error of 0.09 and a *t* ratio of 3.81 ($p < .05$). This indicates that, on average, number of parents is significantly and positively related to the property offences scores within cities. This means that when all other variables in the model are held constant, children who came from single parent families had a 0.36 point higher score than children who were from two parent families in property offences.

Table 16

Results from the Child-level Model on Property Offences

Fixed effects	Coefficient	*se*	*t*-ratio	*p*
Adjusted city mean, γ_{00}	1.02	0.03	34.13	.000
Age-property[x] slope, γ_{10}	-0.04	0.01	-3.10	.005
Gender-property slope, γ_{20}	-0.44	0.07	-6.64	.000
SES-property slope, γ_{30}	-0.38	0.11	-3.56	.002
Nparents[y]-property slope, γ_{40}	0.36	0.09	3.81	.001
Random effects	**Variance component**	***df***	**χ^2**	***p***
City mean, u_{0j}	0.01	24	23.92	>.500
Age-property slope, u_{1j}	0.00	24	37.83	.036
Gender-property slope, u_{2j}	0.03	24	32.23	.121
SES-property slope, u_{3j}	0.14	24	70.11	.000
Nparents-property slope, u_{4j}	0.08	24	34.75	.072
Level 1 effect, r_{ij}	1.80			
Proportion of variance explained	**Between children**		**Between cities**	
	9.1%		NA[z]	

Note. [x]Property represents "property offerences." [y]Nparents represents "number of parents." [z]NA means not applicable.

The estimated variance among the means is $\hat{\tau}_{00} = 0.01$, with a Chi-square test $\chi^2_{24} = 23.92$, $p \geq .05$, suggesting that the null hypothesis is tenable. Thus, no significant differences exist among the 25 city means, a result similar to that found for the "null model". This indicates again that child characteristics, rather than city characteristics were responsible for variation among low SES children in property offences. About 9.1% of the variance in property offences outcome measure was explained at the child level. Hence, age, gender, SES, and number of parents together accounted for about 9.1% of the child-level variance in the outcome.

Two of four slopes were significantly different from zero. The relationship between age and property offences, and between SES and property offences varied significantly across cities. However, as pointed out before, the focus of the present study was on the intercept and not the slopes. Since the intercept does not vary significantly at the city level, the effects of the city-level variables were not estimated for property offences.

For the child-level model on property offences, the reliability estimate is 0.17, indicating that the sample means tend to be poor indicators of the true city means. This finding is comparable to the same finding for the null model.

Summary

In this study, the influence of the six child level variables and the eleven city level variables on six children's behavioral and emotional outcomes was examined. These results are summarized in Table 17. This study addressed four research questions. The findings that address each question are summarized below.

1. *What is the average level of behavioral and emotional outcomes among low SES children in Canadian cities*?

Nationally, the grand mean for prosocial behavior was 12.23 on a scale ranging from 0 to 20. The grand mean for hyperactivity-inattention was 4.89 on a scale ranging from 0 to 16. The grand mean for conduct disorder-physical aggression was 1.51 on a scale ranging from 0 to 12. The grand mean for indirect aggression was 1.36 on a scale ranging from 0 to 10. The grand mean for emotional disorder-anxiety was 2.79 on a scale ranging from 0 to 15. The grand mean for property offences was 1.00 on a scale ranging from 0 to 12. As previously noted, for all outcome measures, a high score indicates a greater presence of each behavioral and emotional outcome. Therefore the results did not seem to raise any serious concerns for the low SES children.

2. *How do behavioral and emotional outcomes of low SES children vary across Canadian cities*?

The results showed significant variation among cities in low SES children's prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression scores. Variation across cities was not found for indirect aggression, emotional disorder-anxiety, and property offences. Therefore, child characteristics rather than city characteristics were responsible for variation among low SES children in indirect aggression, emotional disorder-anxiety, and property offences. Although both child and city characteristics were responsible for variation among low SES children's prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression, most of the variation was accounted for by child characteristics.

3. *What child characteristics contribute to the variation in behavioral and emotional outcomes of low SES children in Canadian cities*?

As summarized in Table 17, at the child level, for prosocial behavior, child age and gender were significantly and positively related to the mean prosocial behavior score, while number of parents was significantly and negatively related to the mean prosocial behavior score. For hyperactivity-inattention, child gender and number of siblings were significantly and negatively related to the mean hyperactivity-inattention score, while number of parents was significantly and positively related to the mean hyperactivity-inattention score. For conduct disorder-physical aggression, child gender was significantly and negatively related to the mean conduct disorder-physical aggression score, while number of parents, and number of siblings were significantly and positively related to the mean conduct disorder-physical aggression score. For indirect aggression, child age, gender, and number of parents were significantly and positively related to the mean indirect aggression score. For emotional disorder-anxiety, child age and number of parents were significantly and positively related to the mean emotional disorder-anxiety score, while SES was significantly and negatively related to the mean emotional disorder-anxiety score. For property offences, child age, gender, and SES were significantly and negatively related to the mean property offences score, while number of parents was significantly and positively related to the mean property offences score.

4. *Do city characteristics affect low SES children's behavioral and emotional outcomes over and above the effects of child characteristics*? *If so, what city characteristics contribute to the variation in behavioral and emotional outcomes of low SES children in Canadian cities*?

As shown in Table 17, significant variation among cities in low SES children's prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression were found in this study. The findings indicated that some city characteristics affected low SES children's behavioral and emotional outcomes over and above the effects of child characteristics. Variation across cities was not found for indirect aggression, emotional disorder-anxiety, and property offences. Therefore, child characteristics rather than city characteristics were responsible for variation among low SES children in indirect aggression, emotional disorder-anxiety, and property offences.

At the city level, for prosocial behavior, percentage of immigrant was significantly and positively related to city mean prosocial behavior outcome and the percentage of low economic family income was significantly and negatively related to city mean prosocial behavior outcome. For hyperactivity-inattention, percentage of immigrant and percentage of labor force working in health were significantly and negatively related to city mean hyperactivity-inattention outcome. For conduct disorder-physical aggression, percentage of the total population between 15 and 64 years of age was significantly and negatively related to city mean conduct disorder-physical aggression outcome. The effects of the city-level variables were not estimated for indirect aggression, emotional disorder-anxiety, and property offences, because variation across cities was not found for these dependent variables.

Table 17

Summary of the Significant Effects of Six Child-level Variables and Eleven City-level Variables on Six Children's Behavioral and Emotional Outcomes

Child-level Variables	**Prosocial**	**Hyperactivity**	**Conduct**	**Indirect**	**Emotional**	**Property**
Age of child	+			+	+	-
Gender of child (F=1, M=0)	+	-	-	+		-
SES					-	-
Child's single parent status (single=1, both=0)	-	+	+	+	+	+
Siblings		-	+			
Family size						
City-level Variables						
Population size						
Percentage of total population aged 15 to 64			-			
Divorce rate						
Percentage of immigrants	+	-				
Unemployment rate						
Percentage of labor force working in health		-				
Percentage of labor force working as teachers and professors						
Percentage of labor force working as childcare and home support worker						
Percentage of population 15 and over with post-secondary education						
Percentage of migrants						
Percentage of low economic families income	-					
Proportion of Variance Explained						
Between children	6.8%	5.0%	5.9%	6.6%	5.5%	9.1%
Between cities	32.4%	29.4%	50.0%	NA	NA	NA

Note. Prosocial represents "prosocial behavior." Hyperactivity represents "hyperactivity-inattention." Conduct represents "conduct disorder-physical aggression." Indirect represents "indirect aggression." Emotional represents "emotional disorder-anxiety." Property represents "property offences." "+" means the variable was significantly and positively related to the outcome. "–" means the variable was significantly and negatively related to the outcome. The empty cell means no significant influence from the variable. NA means not applicable.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter first presents the summary of the study, followed by the discussion of the findings in the study. Implications for practice and future research are then given. The chapter ends with limitations of the study and the conclusions.

Summary of the Study

The purpose of this study was to explore whether social and economic characteristics of a city influence the behavioral and emotional outcomes of Canadian children within socially disadvantaged families. To do so, a two-level HLM was developed using the first cycle of the NLSCY and the 1996 census data gathered from 25 Canadian major cities. Prosocial behavior, hyperactivity-inattention, physical aggression-conduct disorder, indirect aggression, emotional disorder-anxiety, and property offences were examined through 6 child-level variables and 11 city-level variables. The study included 2,362 children between 4 and 11 years of age who came from low SES families. HLM was used to examine the variation in socially disadvantaged children's behavioral and emotional outcomes within and between cities. The aim was to determine whether there are city "effects" that are associated with children's behavior and emotional outcomes regarding risk and resilience. In other words, are some cities more effective than others in reducing childhood vulnerability, and if so, why? The HLM analysis estimated a separate regression model for each city. These analyses provided an estimate for each city of the expected score of a child with nationally average background characteristics. The analysis revealed how much variation exists among cities, and whether the city effects were related to characteristics of the city.

Discussion of the Findings

The results showed significant variation among cities in low SES children's prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression scores. Variation across cities was not found for indirect aggression, emotional disorder-anxiety, and property offences. Therefore, child characteristics rather than city characteristics were responsible for variation among low SES children in indirect aggression, emotional disorder-anxiety, and property offences. Multiple factors were found to be associated with low SES children's behavioral and emotional outcomes. In this section, particular attention is given first to prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression because significant variation across cities was found for these outcomes. The findings related to indirect aggression, emotional disorder-anxiety, and property offences are discussed later.

Findings from Prosocial Behavior, Hyperactivity-Inattention, and Conduct Disorder-Physical Aggression

This study revealed the following findings regarding risk and resilience:

1. *Children from low SES families do not appear to have serious problems regarding their prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression.*

Nationally, the grand mean for prosocial behavior was 12.23 on a scale ranging from 0 to 20. The grand mean for hyperactivity-inattention was 4.89 on a scale ranging from 0 to 16. The grand mean for conduct disorder-physical aggression was 1.51 on a scale ranging from 0 to 12. As previously noted, for all outcome measures, a high score indicates a greater presence of each behavioral and emotional outcome. Therefore the

results did not seem to raise any serious concerns for the low SES children. However, it should be kept in mind that low SES children were the only focus group for the purpose of this study, and no statistical comparisons with other groups were made. Further research needs to be conducted to compare the results from different groups.

2. *Low SES children are less likely to be vulnerable if they are female and if they are from two parent families.*

Gender and child's parent status were the most consistent predictors of prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression. Significant gender differences were observed indicating girls not only score higher in prosocial behavior, but also score lower in hyperactivity-inattention and conduct disorder-physical aggression than boys. At the same time, low SES children who came from single parent families are particularly vulnerable to behavior problems. Low SES children in single parent families have greater risks of having hyperactivity-inattention and conduct disorder-physical aggression problems than low SES children in two parents families. They also have lower prosocial scores.

The findings of gender differences in prosocial behavior are consistent with the results of previous empirical studies on children's prosocial behavior in the general population (Benenson et al, 2003; Eisenberg & Fabes, 1998; Parrila et al., 2002). It is interesting to note that, in the research literature on children's prosocial behavior, gender differences are more pronounced in self-report measures than in observational measures (Eisenberg & Fabes, 1998; Grusec et al., 2002; Vasta et al., 2004). In the present study, however, the results were based on parent surveys. Gender differences in hyperactivity-inattention and conduct disorder-physical aggression are also consistent with the findings

of previous studies (Barkley, 1998, 2003; Gershon, 2002; Kauffman, 2005). As is known, children whose attention deficits are accompanied by hyperactivity and impulsivity are more likely to have conduct disorders than those who show attention deficits and disorganization without hyperactivity (Kauffman, 2005). The close link between hyperactivity-inattention and conduct disorder-physical aggression may explain the similar patterns displayed in these two outcomes as they related to gender. It is worth noting that gender differences have been found in previous studies on hyperactivity-inattention and conduct disorder-physical aggression. Among those referred for clinical diagnosis, boys far outnumber girls (Barkley, 1998, 2003; Gershon, 2002). The preponderance of boys with hyperactivity-inattention and conduct disorder-physical aggression may reflect a combination of biological susceptibilities and socialization processes involving social roles, models, expectations, and reinforcement.

The negative effects of single parent status on children's behavioral and emotional outcomes are worth noting. Single parent status is the only variable that was significantly related to every behavioral and emotional score in this study. Not only do low SES children in single parent families have increased risks of having hyperactivity-inattention and conduct disorder-physical aggression problems, but they also have lower prosocial behavior scores. Previous literature supports the notion that poor children of single-parent families are more vulnerable to emotional and behavioral problems (Lipman et al., 2002; Luthar, 1999). It is conceivable that single-parent household status exacerbates the already difficult situation faced by children who are from low SES families. Presently the literature is limited on how single-parent status influences the development of prosocial behavior. In this study, however, number of parents was

significantly and negatively related to the prosocial scores of low SES children. The combination of single-parent status and low SES may increase the family stress particularly faced by single parents, which can negatively affect single parents' parenting practices and even impair their abilities to function in a warm and consistent manner which, in turn, places children at risk of developing behavioral and emotional difficulties. The development of prosocial behavior, therefore, is hindered.

In contrast, the effects of other factors tend to vary depending on the outcome considered. For instance, a child's age is positively related only to the low SES children's prosocial behavior outcome, indicating older children tend to have better prosocial skills. This finding is consistent with previous literature (Eisenberg & Fabes, 1998; Vasta et al., 2004). There were no significant age differences in hyperactivity-inattention and conduct disorder-physical aggression. Low SES children with more siblings displayed significantly more conduct disorder-physical aggression but less hyperactivity-inattention problems. According to Kazdin (1997), families with a large number of children place youth at risk for the onset of conduct disorder. Findings from the present study, in which the number of siblings is associated significantly and positively with conduct disorder-physical aggression, support this notion. It is not clear why the number of siblings had a negative relationship with low SES children's hyperactivity-inattention scores. Further investigation is needed. Although larger family size has been repeatedly shown to be a risk factor for delinquency and conduct disorder (Kauffman, 2005), in this study, family size was not a significant factor for any of the behavioral and emotional problems.

3. *Significant city-level effects on prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression exist. However, most of the variation is accounted for by child characteristics.*

At the city level, low SES children living in cities with large numbers of immigrants showed better prosocial skills and less hyperactivity-inattention problems than those in cities with smaller numbers of immigrants. Low SES children who live in cities with a high percentage of low economic family incomes showed worse prosocial outcomes than low SES children living in cities with a smaller percentage of low family incomes. Also, low SES children living in cities with a large number of people working in health care showed reduced incidence of hyperactivity-inattention. Low SES children living in cities with a large population aged 15 to 64 showed fewer conduct disorder-physical aggression problems. The remaining city characteristics considered in the present study were not associated with children's behavior and emotional outcomes.

It appears that a higher percentage of immigrants in a city has a positive impact on both prosocial behavior and hyperactivity-inattention. Although it is not clear why this is the case for low SES children, one may speculate that many immigrant families pay special attention to their children's education and their school performances in hopes of ensuring a brighter future for their children (Kao, 2004). Their high expectations may have some positive effects on their children's behavioral and emotional outcomes through the way they interact with their children, and through what they expect from the outside world such as teachers, daycare, and schools. The collective beliefs in education and the collective efforts to ensure their children perform well may help to create an environment in which prosocial skills and self control are more valued. The immigrant

population in Canada has been growing rapidly in recent years (Statistics Canada, 2005). Findings like this have rather positive implications for the immigration policies of Canada. It is also interesting to find that low SES children can benefit from living in cities with smaller percentages of low income families. The significant negative association between low SES children's prosocial behavior and the percentage of low family incomes indicates that low SES children living in socioeconomic disadvantaged cities will likely make their conditions worse. This finding supports the notion that poverty has a collective effect (Goldstein & Rider, 2005). It implies that reducing social economic disparity in a city may help improve low SES children's prosocial skills.

The findings revealed that low SES children who live in cities with higher percentages of health care workers have reduced incidence of hyperactivity-inattention. It is possible that the benefit of having more health workers may help identify this behavioral and emotional problem earlier or may help to develop early intervention programs that could help both parents and children to stabilize the symptoms. Further investigation of this association is needed. It is difficult to speculate on the result that low SES children who live in cities with a large population aged 15 to 64 have reduced incidence of conduct disorder-physical aggression. Future research may able to provide some answers.

It is important to note that, although significant city effects were clearly found in this study, most of the variation was accounted for by the child characteristics. This result supports Bronfenbrenner's ecological theory that events in the microsystem have the greatest impact on children and play a decisive role in contributing to the development of resilience in children (Bronfenbrenner & Morris, 1998). However, the effects of the large

cultural setting defined by the macrosystem also have some influence on the healthy or problematic development of children.

In summary, the simultaneous examination of the contributions of multiple factors from different levels related to the different behavioral and emotional outcomes revealed that, for prosocial behavior, low SES children are more likely to be prosocial if they are older and female and if they are from two parent families. Further, low SES children benefit from living in cities with a high percentage of immigrants and a low percentage of low income families. For hyperactivity-inattention, low SES children are more likely to be vulnerable if they are boys with fewer siblings, and if they are from single parent families. However, if they live in cities with a higher percentage of immigrants and a higher percentage of the labor force working in health care, they have reduced incidence of hyperactivity-inattention. Similarly, for conduct disorder-physical aggression, low SES children are more likely to be vulnerable if they are boys with more siblings, and if they are from single parent families. But, if they live in cities with a large population aged 15 to 64, they have reduced incidence of conduct disorder-physical aggression.

Findings from Indirect aggression, Emotional Disorder-Anxiety, and Property Offences

In the case of indirect aggression, emotional disorder-anxiety, and property offences, this study revealed the following findings regarding risk and resilience:

1. *Children from low SES families do not appear to have serious problems regarding their indirect aggression, emotional disorder-anxiety, and property offences.*

Nationally, the grand mean for indirect aggression was 1.36 on a scale ranging from 0 to 10. The grand mean for emotional disorder-anxiety was 2.79 on a scale ranging

from 0 to 15. The grand mean for property offences was 1.00 on a scale ranging from 0 to 12. As previously noted, for all outcome measures, a high score indicates a greater presence of each behavioral and emotional outcome. Again, the results did not appear to raise any serious concerns for the low SES children.

2. *Age and a child's single parent status are the most consistent predictors of risk outcomes on indirect aggression, emotional disorder-anxiety, and property offences.*

A child's age was significantly related to low SES children's behavior outcomes in indirect aggression, emotional disorder-anxiety, and property offences. Older low SES children showed higher scores on indirect aggression and emotional disorder-anxiety, but lower scores on property offences. The findings of age differences are generally consistent with previous literature (Luthar, 1999). It is believed that in preschoolers, physical and instrumental aggression gradually gives way to verbal and hostile aggression. For school-age children, the overall level of aggression tends to decrease with age (Coie & Dodge, 1998; Vasta et al., 2004). In the present study children were between 4 and 11 years of age. Since the onset of emotional disorder-anxiety is likely to occur between the ages of 8 and 10, it is reasonable to find a positive relationship between age and the emotional disorder-anxiety scores.

Again, a child's single parent status was significantly and positively related to all three behavior problems mentioned above, indicating that low SES children who came from single parent families are more vulnerable to behavior problems such as indirect aggression, emotional disorder-anxiety, and property offences than low SES children in two parents families. These findings are also consistent with previous literature (Luthar, 1999; Willms, 2002).

3. *There are significant gender differences in the low SES children's behavior outcomes on indirect aggression, and property offences. A significant negative effect of SES on emotional disorder-anxiety and property offences was found.*

The results of the present study revealed that girls score higher than boys in indirect aggression, but boys score higher than girls on property offences. These findings are consistent with previous literature (Crick & Grotpeter, 1995; Galen & Underwood, 1997; Kauffman, 2005). Given the evidence that boys and girls may experience differential treatment by parents and society, the observed gender differences may result from different socialization (Williams et al., 2003; Vasta et al., 2004). Other factors such as modeling and expectations of parents and society may also need to be examined in the future. It is important to note that, among low SES children, those with lower SES have a higher risk of displaying problems of emotional disorder-anxiety and property offences. It is possible that extreme poverty is associated with certain family characteristics which create a stressful and dysfunctional environment that may cause more harm to children's emotional states (Felner, 2005). As a result, children who live in such family environments may experience more anxiety or anger. Based on this finding, reducing the severity of hardship faced by low SES families may help reduce the problems of emotional disorder-anxiety and property offences in low SES children.

In summary, only the child-level variables were influential in the cases of indirect aggression, emotion disorder-anxiety, and property offences. For indirect aggression, low SES children are more likely to be vulnerable if they are older and female, and if they are from single parent families. For emotional disorder-anxiety, low SES children are more likely to be vulnerable if they are older and are from even lower SES family background,

and if they are also from single parent families. For property offences, low SES children are more likely to be vulnerable if they are younger, male, are from single parent families, and have lower SES.

Implications for Practice and Future Research

The results of this study suggest that a child's social ecology consists of many different systems, each of which has the capacity to influence developmental outcomes. Although factors in the microsystem have much stronger impacts on low SES children's behavioral and emotional outcomes than factors in the macrosystem, the influence of the macrosystem should not be ignored. To be effective, prevention and intervention programs should be broad-based and include strategies that account for the presence of effects at multiple system levels. On the other hand, the proportion of variance in low SES children's behavioral and emotional outcomes that can be explained by city factors was quite small. This indicates that across different outcome measures, the fraction of total variability that is due to the city level factors was much less important than the child level factors. Hence, the most effective prevention and intervention programs probably would be the ones developed at the micro level since factors at this level play a decisive role in the healthy development of children.

Because gender and a child's single parent status are the most consistent predictors of risk and resilience in low SES children's behavioral and emotional outcomes, child focused programs that are separately designed for boys and girls and for low SES children who are from single parent families could be effective as prevention and intervention strategies. Early interventions specifically targeted at peer-group relationships may provide these children with opportunities to learn and to develop skills

that are essential for social interaction, problem solving, self control, and anger management. Programs that provide parenting education, counseling, and social and emotional support for low SES single parents seem to be especially relevant. Employment and educational programs specially targeted for low SES single parents may also help these parents to improve parenting and employment skills, which in turn, may assist with better child development. Additional financial assistance may also be helpful in reducing the stressful situation in those families.

Significant city-level effects on prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression provide evidence for the need to develop city-level programs for prevention and promotion of well-being in the general population. In an effort to promote behavioral and emotional resilience of children and families, one area that requires particular attention at the city level is the promotion of public health care services. An adequate delivery of public health care services can be crucial. Public health care services can provide appropriate professional help and guidance to those children and families who are most in need. Providing easy access to health care services within cities can be an effective strategy for designing preventive interventions to reduce the incidence of behavioral and emotional problems, as well as promoting resilience in socially disadvantaged children. An intriguing finding of this study is that low SES children who live in cities with a higher percentage of health care workers have reduced incidence of hyperactivity-inattention. This suggests that health care workers may have an important role to play in the community in reducing the incidence of hyperactivity-inattention. Moreover, it is important for policy makers to be aware that through public

health services, health care workers are in a better position to empower the public with knowledge to make the best decisions for the healthy development of children.

Many factors and forces may affect children's emotional and behavioral outcomes in regards to risk and resilience. The present study was limited only to the characteristics of the child and the city. This is not to deny or understate the importance of other variables such as parent-child interaction, family environment, school environment, and peer group influences. In fact, the results of this study call for additional research to investigate these factors. For example, about 6.8% of the variance in the prosocial behavior outcome measure was explained at the child level by child's age, gender, and number of parents. About 32.4% of the city-level variance was explained by the variable of the percentage of immigrants and the variable of percentage of low family income. Taken together, the child and city level results suggest the need for additional variables at both levels to fully explain the variation in prosocial behavior. Since about 98% of the total variance in prosocial behavior is attributable to within city differences, the need for additional variables is particularly true at the micro (child) level. This also applies to the other outcome variables.

In this study, only low SES children were the focus group. No statistics significant comparison with other groups was made. It would be interesting to know whether behavioral and emotional outcomes of low SES children differ from the rest of the population. If so, what child and city characteristics make a difference? Further research can be conducted to provide answers.

Limitations of the Study

As indicators of the true city means, the reliability estimates in this study tend to vary from moderately reliable to not reliable depending on the outcome variables that were measured. The reliability estimate was 0.51 for prosocial behavior, 0.43 for hyperactivity-inattention, 0.24 for conduct disorder-physical aggression, 0.27 for indirect aggression, 0.29 for emotional disorder-anxiety, and 0.17 for property offences. The reason that reliabilities vary across cities is because city sizes vary. Therefore, the overall measure of the reliability is the average of the city reliabilities. In this case, cities with small populations are particularly susceptible to the effects of shrinkage in which their means are pulled toward the grand mean. As a result, the sample means tend to be less reliable as indicators of the true city means. This limits the interpretation of the results of the study.

As mentioned before, in the present study, only the first cycle of the NLSCY data was used. However, based on cross-sectional data, it is difficult to determine whether factors that are identified in this study will have consistent effects for the same group of children at different ages. Further, many low SES family's circumstances may change, parents with children may remarry or divorce, some improve their economic circumstances, and others deteriorate. Only the longitudinal study will provide information on the long-term trajectories of children's outcomes and how these are related to individuals' characteristics and experiences.

Conclusions

This study has identified several child and city characteristics that were significantly associated with children's behavioral and emotional outcomes. The

significant variation among cities in low SES children's prosocial behavior, hyperactivity-inattention, and conduct disorder-physical aggression provides empirical evidence that there are city effects associated with these behavioral and emotional outcomes. Although findings from this study has provided further information on factors that contribute to the low SES children's behavioral and emotional outcomes, much still remains to be learned.

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